THE MANVALL

of the Anatomy or dissection of the body of Man,

Which usually are shewed in the publike Anatomicall exercises.

Methodically digested into 6 Books.

By Alexander Read. D: *of Physick.*

London

Printed for Rich. Thral *and are to be sould at his shop at the signe of the* [illegible] *in Cheapside.*

The Manual
OF THE
ANATOMY
OR
DISSECTION
Of the Body of
MAN:

Containing the enumeration, and description of the parts of the same; which usually are shewn in the publick Anatomical Exercises.

With sundry Figures thereunto belonging.

The Fifth Edition.

By *ALEXANDER READ*, *Doctor of Physick; a fellow of the Physicians College of* London; *and a Brother of the Worshipful Company of the* BARBER CHIRURGIANS.

LONDON, Printed by *S. Griffin*, for *Richard Thrale*, at the sign of the Cross-Keys, at Pauls-Gate, 1655.

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CAROLO

Magnæ Britanniæ Monarchæ Hiberniæque ac Galliæ Regi potentissimo fausta omnia precor.

EN offero Majestati vestræ lucubratiunculas istas Anatomicas: Munus fateor te minimè dignum, quem Deus ad supremum ferè honoris in terris

culmen evexit. Nihilominus si omnia justo trutinæ examine pensentur, quivis æquus arbiter pronuntiabit eas ad te properare debere. Cogitaverat pridem apud se Majestas vestra quàm utile, imo necessarium huic Reipublicæ sit multos habere peritos Chirurgos, sive Pax alma floreat, sive Bellum ingruat. Quapropter ea sanxit, ut doctus aliquis ac peritus medicus communionis hujus fratribus ex suggestu, singulis diebus Martis, huic exercitio destinatis, præcepta artis traderet ab auditoribus excipienda, atque Anatomicis dissectionibus temporibus constitutis præesset. Quum ea munia mihi obeunda ante aliquot annos commissa fuissent, animadverti illorum in rebus Anatomicis profectum mirè tardatum, quod nullum haberent compendium Anatomicum, lingua vulgari emissum. Ut huic desiderio occurrerem, compendiolum tale in lucem

cem emisi, ex cujus lectione tyrones fructum aliquem percepere. Verum quum proficientibus visum fuisset nimis jejunum, sumpsi id iterum in manus, ac copiosiùs de humani corporis partibus disserui. Quum itaque secunda cura reficium in lucem emittendum sit, ad quem potius, quàm ad vestram Majestatem tendet, quæ primæ fœturæ auctrix fuit? Nec est quod verear me audaciæ, aut inverecundiæ crimen incursurum: Quum mihi securitatem promittat eximia vestra comitas atque affabilitas erga omnes, quæ omnium amorem conciliant, ut dignitas regia timorem. Quæ duo Sceptra Regibus firmant. Unum hoc Opellæ huic ex hac Dedicatione promittere possum: Eam gratiorem omnibus futuram, quod tanti ac talis Regis nomen sibi præscripserit. Scribebam Londini 4. Calend. Octob. Anni

ab exhibito in carne Messiah, *supra milleſimum ſexcenteſimum triceſimi ſeptimi.*

Veſtræ Majeſtatis
cultor humillimus,

ALEXANDER REIDUS
Scoto-Britannus.

TO

To the READER.

Courteous Reader,

NOw I preſent to Thee the fifth Edition of the Manual of Anatomy, which ſhall be the laſt that ſhall be publiſhed in my life time, which is not far from its period. The Hour-glaſſe haſtneth, and but few ſands remain unrun. The book of the Breſt, and the book of the Brain are altogether new, as the book alſo of the Bones. In this Edition all things are ſet down more fully, Methodically, and Correctly, then in the former. If it give thee contentment, and further thy proceedings, I have obtained that which I aimed at: for I expected no other reward of my labour. I have endeavoured to ſet down all things at-

temperating my ſelf as plainly and ſhortly as I could, to the capacity of thoſe, who begin to addict their minds to this ſtudy. I am not ſo in love with my own labours, as to think that they can profit ſuch as have made a reaſonable progreſſe in it. However, it will ſerve any one in ſtead of an Index, to preſent briefly unto the minde thoſe things which they may finde ſet down at large, in the ample diſcourſes of learned Anatomiſts, as well Ancient as Modern. Make then of it what uſe thou ſhalt think fitteſt, and wiſh well to the Author, who hath endeavoured to eaſe thee of ſome pains, which thou muſt have taken to have contrived ſuch a compend as this is, of the deſcription of the parts of the body of Man.

Vale.

THE

The Explication of the first Figure.

1 *The hairy Scalp.* 2 *The Forehead.* 3 *The Ear.* 4 *The Eyes.* 5 *The Noſe.* 6 *The Mouth.* 7 *The Chin.* 8 *The Temple.* 9 *The Cheek.* 10 *The Arm.* 11 *The Hand.* 12 *The Breſt.* 13 *The Sides.* 14 *The Belly.* 15 *The Genitals.* 16 *The Thighs.* 17 *The Knees.* 18 *The Legs.* 19 *The Feet.*

The Explication of the ſecond Figure.

1 *The back part of the Head.* 2 *The Shoulder.* 3 *The Elbow.* 4 *The Back.* 5 *The Buttock.* 6 *The Hams.* 7 *The Calves of the Legs.* 8 *The Ankles.* 9. *The inſteps.* 10 *The Heel.*

Theſe two figures are to be placed between the epiſtle to the Reader and the firſt chapter.

The Number and Contents of the BOOKS.

THe first Book containeth *the description of the parts of the belly, and hath* 27 Chapters.

The second Book containeth *the description of the parts of the breast, and hath* 12 Chapters.

The third Book describeth the head, and hath 26 Chapters.

The fourth setteth down the veins, arteries, and sinews of the limbs, and hath 7 Chapters.

The fifth Book describeth the muscles of the whole body, and hath thirty one Chapters.

The sixth setteth down the bones, and hath 28 Chapters.

THE

THE FIRST BOOK of the lower Cavity, Called *ABDOMEN.*

CAP. I.

Of the division of the parts of the Body of Man in general.

ANatomy is an artificial separation of the parts of the body by section, practised to attain to the knowledge of the frame of it, and the use of each part. In Anatomical exercises, first the whole carkass doth offer it self, then the parts.

The description of Anatomy.

The

The Regions of the whole.

The whole hath four Regions, to wit, the fore and back parts, and the lateral, which are the right and left.

What the whole and a part signifie.

I call the whole that which containeth the parts, and a part that which is contained in the whole, according to the most ample acception of the term part; for in a more strict acception a part is a body solid cohering with the whole, endued with life, and framed to perform some function.

Things required in a part being strictly taken.

1. A part then must be the solid: humors then cannot be numbred amongst the parts, because they are fluid.

2. Secondly, it must have life: and so the extremities of hairs and nails are not to be accounted parts.

3. Thirdly, one part must not nourish another: and so the blood, fat, and spirits are not parts.

4. Fourthly, it must have a circumscription.

5. Fifthly, it must be united with the whole.

6. Sixthly, it must have some action and use.

The

The principall differences of parts are taken either from their nature or functions. From their nature, parts are said to be either similary or dissimilary. — The differences of the parts.

A similary part is that whose particles are of the same substance and denomination with the whole: as every portion of a bone is a bone. It is otherwise called a simple part. — What a similary part is.

Of simple parts there are ten in number, to wit, The skin, a membrane, the flesh, a fibre, a vein, an artery, a nerve, a ligament, a cartilage, a bone: they are comprehended in these two verses. — The number of simple parts.

Cartilago, caro, membrana, arteria, nervus,
Vena, ligamentum, cutis, os, lentissima fibra.

To these a tendon, which is the principal part of the muscle, may be added; for the substance of it, it is simple, without any composition. — Of a tendon.

Of

The differences of simple parts.

Of the former simple parts, some are simple indeed, and these are in number seven; the skin, a membrane, the flesh, a fibre, a cartilage, a bone. The rest are onely simple to the eye or sense, and not to reason; for a nerve (for example) is composed of many filaments, covered with a membrane.

What a dissimilary part is.

A dissimilary part is that whose portions are neither of the same substance, nor the same denomination; as a muscle, in the which are flesh, a nerve, and a tendon. It is otherwise called a compound part, and an organical part.

Things to be observed in an organical part.

In an organical part four particles are found; First, the chief particle, as the chrystallin humour in the eye.

1. Secondly, that particle, without the which the action cannot be performed, as the optick nerve.

2. Thirdly, that which furthereth the action, as are the membranes and muscles.

3. Fourthly, that by the which

4. the

the action is preserved, as the eyelids.

Of organical parts there are four degrees.

The first is made onely of the similars, as a muscle.

The second receiveth the first kind of organical parts, and other similaries, as a finger.

The third admitteth those of the second degree, as the hand.

The fourth is made of the third and other parts, as the arm.

Parts from their function are said to be either sustaining, or sustained. The bones sustain the frame of the whole body, the rest are sustained. Now these are the cavities or the limbs.

The degrees of an organical part.

1.

2.

3.

4.

The differences of parts taken from their function.

CAP. II.

Of the circumscription, regions, substance, and parts of the Abdomen.

OF all the parts of the body which are sustained, we are to

to begin dissection with the cavities: First, because they offer themselves to the view in the fore region of the body.

Secondly, because they being moist, and apt to receive the impression of the externall heat, soonest putrifie and send out noisome smels. The cavities are appointed to receive the principall parts, and those which minister unto them. Wherefore there are three cavities, according to the number of the principall parts. The head is for the brain, the brest is for the heart, and the belly for the liver. And because this cavity is most subject to putrifaction you are to begin at it. Now foure things concerning it offer themselves. First the circumscription or bondage of it. Secondly, the regions of it. Thirdly, the substance of it. Fourthly, the speciall parts of it.

As concerning the circumscription of it, it is severed from the brest by the midriff. It is bounded above

above by the *cartilago enſiformis*, and beneath by the ſhare bones.

The regions of it are three, the uppermoſt, middlemoſt, and lowermoſt. The uppermoſt, which is bounded between the *mucronita cartilago*, and three inches above the navell, about the ending of the ſhort ribs, hath three parts: The laterall, which are called *hypochondria*, or *ſubcartilaginea*, becauſe they lie under the cartilages of the ſhort ribs. In the right *hypochondrium* lieth the greateſt part of the liver, but in the left the ſpleen, and greateſt part of the ſtomack. The third part is that which before lieth between the two laterall parts, and is properly called *epigaſtrium*, becauſe the ſtomack lieth under it. In this part remarkable is the pit of the breaſt, which is called *λάκκος*, or *ſcrbiculus cordis*, by the moderne Writers. The middlemoſt part extendeth it ſelf from three inches above the navel, to three inches under it. The fore part is where the navel is, from whence

whence it is called *regio umbilicalis*. The two lateral parts have no proper denominations. In the right are contained *inteſtinum cæcum*, with part of *Colon*. In the left part of it, a portion of *Jejunum*, and the reſt of *Colon*. The reſt of *Jejunum* is under the navel. The navel in man is wrinkled, as the forehead of an aged woman; but in other creatures it is only a hard knot without hairs, having no wrinkle. It hath no lateral parts, having no proper names; although *Laurentius lib. 6. Hiſtor. Anatom.* affirmeth it to have, and gives them names; in this region is contained the whole hungry gut.

3. The lower region.

The lower region is called ὑπογάστριον: This region hath three parts, the lateral, and the middlemoſt: The lateral, which reach to the *hypochondria*, are called λαγόνες, becauſe they are the ſeat of luſt, which is called λαγνεία. By *Hippocrates* they are termed πτερύγες, becauſe they being placed between the hanch-bones, and ribs, are

are lank, & ſeem to contain nothing. In Latine they are called *Ilia*, becauſe the *Ilium inteſtinum* lieth under them on every ſide. Beſides this, in the right part are placed portions of the *Colon*, *& cœcum inteſtinum*, which are tyed together. In the left part are contained a great part of the *Colon*, and the *inteſtinum rectum*. *Ilia.*

The fore-part of the *Hypogaſtrium* by *Ariſtot. lib.* 1. *Hiſt. animal.* 3. is called ὑπογάστριον, which *Gaza* calleth Abdomen and Sumen. Under it lieth the *pubes*, which word ſignifieth both the hairs, and the place where the hairs grow, which appeare to bud in girles the twelfth year, but in boyes the fourteenth year, when way is made for the monethly courſes and ſeed, the skin being there made thinner, the heat encreaſing in them. At the ſides of the *pubes* appeare ἕβδωνες, or *Inguina*, the groines. Under this middle region are contained the bladder, the *inteſtinum rectum*, and the matrix in women. *Inguina.*

The

The hindermoſt parts.

The hindermoſt parts are called *lumbi*, the loines, and they reach from the bending of the back to the buttocks, called, *nates*, *ab innitendo*, becauſe when we ſit, we reſt upon them. The fleſhy part on each ſide is called φύα, ἀπὸ τῆ φύεσθαι, *a palpando*, from culling or clapping. In the right loynes, the right kidney; bet in the left, the left kidney is contained.

CHAP. III.

Of the common containing parts of the belly.

THe common containing parts of the belly are foure, the skarf-skin, the skin, the fat, and the *membrana carnoſa*.

The skin in a man is called *cutis*, but in beaſts *aluta*; in Greek it is called δέρμα, and δέρις; either ἀπὸ τῆ δέρεσθαι, becauſe it is eaſily flead off; or from τέγμα, ſeeing it is the end and ſuperficies of the whole body: Of all the membranes of

of the body it is the thickeſt.

It hath a double ſubſtance; the one is external, called ἐπίδερμις ὅτι ἐπὶ τὸ δέρμα τίθεται, becauſe it is placed upon the skin as a cover, but is termed *cuticula* in Latine; for it is as large as a skin, and more compact; for wateriſh ſharp humours, paſſing through the skin, are ſtayed by the thickneſſe of this, and ſo puſtules are cauſed. In man it is as the peelings of the onions. It is without blood and without feeling. *Cuticula.*

Three cauſes concurre to the generation of it; to wit, the materiall cauſe is a viſcous and oleous vapour of the blood. The internall efficient cauſe, the naturall heat of the ſubjacent parts raiſing it up. The externall efficient cauſe is the externall coldneſſe, partly of the aire, partly of the skin it ſelf: It is engendered even as the thin skin in milk, and fat brothe; Ii is hardly ſeparate from the skin with a knife; but eaſily in the living creatures by a v ſicatory, and in dead perſons by

by fire, or ſcalding hot water.

Firſt, the uſe of it is to defend the skin, which is of an exquiſite ſenſe, from external immoderate, either heat or cold. In cold weather it breaketh the cold, that the perſpiration ſhould not be altogether hindered: In hot weather by its compactneſſe it hindereth too great perſpiration.

Secondly, to be a middle between the skin, and the object of feeling.

Thirdly, to ſtay the ichorous ſubſtance from iſſuing from the veines and arteries; for this we ſee when the *cuticula* is rubbed off by any means.

2. The true skin is ſix times thicker than the skarf skin: in children, women, and thoſe which are born in hot countreys, it is thinner; but in men, and in thoſe who inhabit cold countreys, it is thicker.

The Negroes become black, becauſe they having a ſofter skin, and large pores and looſe, many vapours

pours of the aduſt humours, which are raiſed with the ſweat; the groſſer ſubſtance whereof, by reaſon of the exceſſive heat, being dried and burned, cauſed the blackneſſe of the skin; for their infants are not born black, but reddiſh; and they afterwards become black, the *cuticula* growing in them as in us.

The skin in the fore-head and ſides it is thin, thinner yet in the palm of the hand, but thinneſt of all in the lips and cods. In the head, back, and under the heel it is thickeſt. Under the heel the *cuticula* in ſome will be as thick as a barley corn.

The pores will appear in the skin in the winter time, it being bared; for where they are, the *cuticula* will appear as a Gooſes skin.

The skin hath an action, to wit, the ſenſe of feeling.

3. Of fat.

Pinguedo, πιμέλη, *eſt humor oleoſus noſtri corporis à calore moderato ſubjectarum illi partium elevatus, ac inter membranam carnoſam ac cutem*

cutem concreſcere, quæ partes ſunt denſiores ac frigidiores. Ejus duæ ſunt ſpecies, axungia, μύελη, & ſænum, ſive στέαρ.

Its kinds. They differ; for firſt, *axungia* is in beaſts not horned, which are full toothed; but *ſævum* in beaſts not horned, which are not full toothed.

Secondly, *axungia* is eaſily melted, but not ſo eaſily congealed; but *ſævum* is not eaſily melted, but is eaſily congealed.

Thirdly, greaſe is not brittle, but tallow is. The fat under the skin is greaſe; but in the caul, kidneyes, the heart, the eyes, and about the joints, it is tallow.

The uſes of it are theſe: Firſt, it defendeth the body from the air; ſo Apothecaries, when they mean to preſerve juices, they pour oil upon them.

Secondly, it preſerveth the natural heat.

Thirdly, it furthereth beauty by filling up the wrinkles of the skin.

Fourthly,

Fourthly, in the Muſcles it filleth up the empty places, it is under the Veſſels that they may paſſe ſafely; in the intrals it helpeth concoction, in the Buttocks it is as down in a pillow.

Membrana carnoſa, or ὑμὴν σαρκώδης, ſo called in Man, not that it is in him fleſhie, but nervous, and ſo *Nervea*; but becauſe in Beaſts, which the Ancients uſed moſt commonly to diſſect, it is endued with fleſhie Fibres; in the birth it is red, but in thoſe of ripe age white; in the forehead and neck it is more fleſhie. Within it is bedewed with a viſcuous Humour, to further their motion by keeping the ſuperficies of them from deſiccation, which otherwiſe might fall out by reaſon of their motion. It is of an exquiſite ſenſe, whereof when it is pricked with ſharp Humours, it cauſeth groovings, ſuch as are felt in the beginning of Ague-fits. Firſt it preſerveth the heat of the internall parts. Secondly, it furthereth the gathering

4. *Membrana carnoſa.*

Its uſes

thering of the fat. Thirdly, it ſtrengtheneth the Veſſels which paſs between it and the skin.

Cap. IV.

of the proper containing parts.

THE proper containing parts, are the Muſcles of the belly, and the *Peritonæum*. Of the Muſcles we have ſpoken elſwhere, *Chap.* 17.

Peritonæum is tyed about to the Midriff, below to the ſhare and flank-bones; in the fore-part firmly to the tranſverſe muſcles, but chiefly to their Tendons about the *Linea alba*; behinde to the fleſhy heads of theſe Muſcles looſely, and the membrane of the Nerves, which come from the *vertebræ* of the loynes. The end of this firm connexion is to preſſe equally the belly, for the expulſion of the Ordure, and breathing. If this connexion had not been, the *Peritonæum* would

would have become wrinkled, the Muſcles being contracted. If it had not been looſe tyed to the fleſhy parts, the contraction of them in the compreſſion of the belly had been hindred.

As for the proceeding of it, *Fallopius* will have it to proceed from a ſtrong twiſting of ſinewes, from whence the *Meſenterium* hath its beginning. Some will have it to proceed from the Ligaments by the which the *vertebræ* of the loyns and the *Os ſacrum* are tyed together.

Picolhomineus will have them to be framed of thoſe nerves which ſpring out of the *ſpinalis medulla*, about the firſt and third *Vertebra* of the loynes, which are tyed together by both the meninges, when they march further. Here it is very thick, becauſe it was to be much extended.

It is double every where, but chiefly about the *vertebræ* of the loynes, where between the duplications lye the *Vena cava*, the *Aorta*

and the Kidneys. In the *Hypogaſtrium*, two tunicles are apparently ſeen, between which the bladder and matrix lie. All the parts which receive nouriſhment from the *Vena cava*, are ſeated between the coats, as the forenamed parts; but thoſe which receive nouriſhment from the *Vena porta*, as are they which ſerve for concoction of nouriſhment, are not; the umbilicall Veſſels alſo are placed in the duplicature of the *Peritonæum*, that they may march the more ſafely.

To the beginning of the productions of the *peritonæum* the inner coat cleaveth firmly, and ſhutteth the hole by the which the ſpermatick veſſels paſſe from the lower part of the belly. If this be broken, the outer coat is relaxed, and ſo a rupture is cauſed.

The *Peritonæum* is thickeſt; Firſt, where there are manifeſt humours, to hinder the breaking of the ſubjacent parts, and iſſuing out of them, as above the ſtomack.

Secondly,

Secondly, where many veſſels and ſpirits are, as above the ſpleen.

Thirdly, where much ſtretching is required, as above the bladder, matrix, and ſtomack.

CHAP. V.

Of the Omentum.

THe parts contained ſerve either for nutrition, or procreation. As for the parts ſerving for nutrition, they either ſerve for chylification, or ſanguification. The principle efficient cauſe of chylification, is the ſtomack; but the adjuvants are the Caube, and the *Pancreas*. Of the part contained in the lower belly.

The principall efficient cauſes of ſanguification, are the liver and ſpleen, but the other parts are the adjuvant cauſes. Of theſe ſome receive the excrements of the chylification, as the guts. The excrements of the ſanguification are two, choler, and the watriſh humour. The thinn Choler is received

by the *vesica fellea*; but the grosse choler, by the *meatus cholidochus*: The watrish humour is turned to the kidneyes, and from thence to the bladder, by the ureters.

The parts appointed for procreation, are the genitals, both in men and women. Next then to the *Peritonæum* is the *Omentum*, or caul, in Greek it is called ἐπίπλοον, ἀπὸ τοῦ ἐμπλέειν, because it seemeth to swim above the upper guts. The *Arabians* call it *Zirbus*.

Its substance.

It is composed of two membranes

Its connexion.

The uppermost doth spring from about the bottome of the stomack, from the common coat of it, and is tyed to the hollow part of the liver and spleen.

The lowermost doth spring from the *Peritonæum*, immediatly under the midriff towards the back, and is tied to the hollow part of the liver, to the midriff, to the *duodenum intestinum*, to the convex part of the spleen; and last of all, to all that part of the *Colon* which marcheth under the stomack.

It

It hath veins only from *porta gaſtoepiplois dextra & ſiniſtra:* they are inſerted into the upper membrane, but *epiplois dextra & poſtica* into the inferiour membrane. Its veines

It hath ſo many arteries from *ramus cæliacus, & meſentericus.* It hath ſmall ſinewes from the coſtal branch of the ſixth paire. It hath much fat: if it be plentifull, and the caule reach to the *os pubis,* in women it cauſeth ſterility, by compreſſing the mouth of the matrix; in men it cauſeth a Rupture, by relaxing the *peritionæum:* This rupture is called *epiploenterocele.* Its arteries. Its ſinews.

In figure it repreſenteth a Faulconers pouch, according to *Galen*: The mouth is round, and the bottome is made by the two membranes joyned together. This will appeare if you fill it with water, by *Galens* advice. Its figure *6 De anat adminiſt.*

It is then of ſubſtance membranous, that it might admit dilata- The reaſon of the frame of it.

tion and extenſion. It is thin, that it ſhould not burden the ſubjacent parts; it is compact to hinder the diſſipation of the internall heat, and to repel the externall cold.

The fat. The fat is about the veines and arteries, to ſtrengthen them from being compreſſed by the repletion of the belly, and other motions. When the ſtomack is full, and the guts empty, the upper membrane is raiſed, the lower remaining in its owne place; but if the guts be full, and the ſtomack empty, then the lower membrane riſeth up, the upper remaining in its own place. It is tyed to the ſtomack, being a middle part between the colon and the ſpleen; and that it ſhould not totter from ſide to ſide, it is tyed in the right ſide to the colon and liver; but in the left ſide to the ſpleen.

Its beginning. It hath its beginning from thoſe parts unto which it is tyed, that it might receive veines and arteries from thence for blood and life. The lower part is free and untyed, that

that ſomtimes the upper, ſomtimes the lower membrane might riſe up.

The uſes of it are three: Frſt, it cheriſheth the internall heat of the ſtomach and inteſtines.

Secondly, it miniſtreth nouriſhment to the parts in the time of famine, *Galen. de uſ. part. l. 2. c. 11.*

The third is to contain the humours flowing from the inteſtines, which the glandules cannot receive wholly at one time, *Hippoc. lib. de glandulis.*

An obſervation

Creatures which have no caul, help the concoction, by doubling their hinder legs, and reſting their belly upon them, as Hares and Conies.

Another.

They who have had a portion of it cut off, becauſe it was corrupted, having fallen out by reaſon of a wound received in the *abdomen*, have afterward a weak concoction, and are enforced to cover the belly well. See *Galen. lib. 4. de uſu part. 9.* where he proveth this by example.

Cap. VI.

Of the Gula.

The marching of it.

THe Gullet or weazand is an organicall part, which beginneth about the root of the tongue, and passeth from thence directly between the wind-pipe, the *vertebræ* of the neck, and the foure first *vertebræ* of the breſt, upon the which it resteth; but when it is come to the fifth *vertebra* of the breſt, it giveth way to the trunke of the great artery descending, by turning a little to the right side: afterward accompanying the arterie to the ninth *vertebra*, there it is raised up by means of the membranes from the *vertebra*, and marching above the arterie, it passeth through the nervous body of the midriff, and is is inserted into the left orifice of the *ventriculus*: about the eleventh *vertebra* of the breſt.

The names of it.

It is properly called στόμαχος ὅτι στενὸς καὶ μακρὸς, *quia anguſtus & longus*

longus: ſee *Ariſtot.* 1. *hiſtor. animal.* 16. It is alſo called διαφάγον ὅτι ὅιον τὸ φάγημα *quod cibum ad ventriculum vehat.*

It is framed of three membranes. The firſt is the uttermoſt and common, compaſſing the two proper, which it hath either from the *peritonæum*, according to ſome, or from the ligaments of the *vertebræ* of the neck and breſt upon which it reſteth. The ſecond is the middlemoſt, and it is fleſhie and thick, and hath only tranſverſe *fibres*. The third is the innermoſt, and it is membranous; and hath only ſmall and ſtraight *fibres*. Its ſtructure.

It is joyned to that membrane which covereth the throat, palat, mouth, and lips; ſo that before vomiting, ſignes of the lips will appear. Its connexion.

It hath veins both from the *vena cava*, and the *porta*; for it hath ſprings from *vena ſine pari*, while it is yet in the breſt: but where it is joyned to the ventricle, it hath ſome twigs from *ramus coronarius*, The veſſels.

rius, which proceedeth from the *porta*.

It hath arteries from the intercostall arteries, and *ramus cæliacus coronarius*.

Nerves it hath from the sixth paire, which are carried obliquely, for safety, as *Galen* noteth *l. 6. de usu part.* and are very many; which is the cause that the parts about the upper orifice of the ventricle are so sensible.

Its glandules.

It hath four *Glandules*; two in the throat, which are called *Tonsillæ*, or Almonds, common to the *Weazand* and the *Larinx*, which prepare the pituitous humour to moisten them; other two it hath about the middle of it, towards the back, about that place where the *aspera arteria* is divided into two branches, under which it lieth.

The use of it.

The weazand serveth as a funnell to carry meat and drink to the maw; for it receiveth them by dilating its proper internal coat, and turneth them downe by the constriction

ſtriction of the middlemoſt coat, and the muſcles of the *Pharynx*.

CAP. VII.

Of the Ventriculus *or Stomack*

THat part which we term the Stomack in Engliſh, in latin is called *Ventriculus*, to diſtinguiſh it from the great ventricles. In Greek, γαστὴρ and κοιλία, from its cavitie. Its denomination

It is placed immediately under the middriffe, which it toucheth; wherefore if it be too full it cauſeth a difficulty of breathing, by hindering the motion of it. In the forepart and in the right ſide, it is covered with the hollow part of the liver; in the left ſide by the ſpleen; towards the back by the *aorta*, the *vena cava*, and the *pancreas*, which further its heat. Its ſituation.

The bigneſſe of it is commonly ſuch, as is capable to receive ſo much

much food at one time, as ſufficient for nutrition. It is leſſe in women then in men, to give way to the diſtention of the matrix. They who have legal mouths, have large ſtomacks.

Its connexion.

It is joyned with the *gulæ* on the left ſide, where its upper orifice is: it is tyed to the *duodenum*, where the lower orifice is on the right ſide. The bottome is joyned to the upper part of the caul.

Its ſubſtance.

The ſubſtance of it is membranous, that it might admit diſtention and contradiction. It hath three membranes. The firſt is common, which it hath from the *peritionæum* about the upper orifice; it is the thickeſt of all thoſe which ſpring from the *peritenæum*; the fibres of it are ſtraight.

The ſecond is fleſhie, and the fibres of it are tranſverſe, under which a few oblique and fleſhie lye.

The third is membranous, endued with all kinds of fibres; the ſtraight are moſt conſpicuous and plentifull,

plentifull, to embrace the food firmly, untill chylification be perfected, as the second membrane hath oblique to expell the chylus.

It hath also two orifices.

Its orifices. 1.

The one is in the left side, called *sinistrum*, wider than that in the right, that meat not well chewed might the better passe. It is called in Greek καρδία, *Cor*, from whence the paines which happen in it are called καρδιαλγίαι, and καρδιωγμοὶ, because there is a great consent between it and the heart, by reason of the twigs of nerves which proceed from the same branch, which do spring from the sixth paire, communicate to both; so that one being affected primarily, the other must suffer by consent.

This hath orbicular fibres, that the meat and drink being once received within the capacity of the stomack, it might be exactly shut, lest fumes and the heat should break out, which might hinder concoction.

The

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The

The other by the Græcians is called πύλωρος; *janitor*, or doore-keeper, becauſe it, as a Porter, doth make way for the *Chylus* to deſcend to the *duodenum*: It is not wide as the other *orifice*, becauſe it was only to tranſmiſſe the elaborate *Chylus*: wherefore beſides its tranverſe fibres, it hath a thick and compact circle, repreſenting the ſphincter muſcle, that it might the more eaſily open and ſhut.

Its veins. It hath veines, firſt, from the trunk of *vena porta*, and this is *pyloricus ramus*, or from the branches of the ſame: wherefore from *ramus ſplenicus* it hath *gaſtrica*, from whence *Coronaria* ſpringeth; *Gaſtroepiplois ſiniſtra*, and *vas breve*, from the *ramus meſentericus*, before it be divided it hath *Gaſtroepiplois dextra*.

It hath *Arteries* from *ramus cæliacus*, which doe accompany every veine.

Its arteries. It hath many nerves from the ſixth paire, which with the *gula* paſſing through the midriffe, croſſe one

one another; for the right ſinew doth compaſſe the left and fore-part; but the left, the right and hinder part of the ſtomack. So that the upper part of the ſtomack is of an exquiſite ſenſe. Theſe three veſſels paſſe betweene the common and proper coats, and end in their orifices, in the internal membrane.

The cauſe of hunger.

It is the ſeat of hunger, and ſooneſt doth feele the defect of aliment: for blood being ſpent in the veines, upon the nouriſhment of the body, the *fibres* of the internall membrane of the ſtomack are contracted, and ſo this pain, which is called hunger, is cauſed.

Its action *Chylus*

The action of the ſtomack is Chylification: now *Chylus* is a white juice reaſonable thick, like Barley creame, wrought by the faculty of the ſtomack, out of the aliments. This is chiefly elaborate by the heat of the ſtomack, yet the adjacent parts putting to their helping hands; as in the right ſide, the

the liver; in the left, the ſpleen: above the midriffe, below the guts before the caule, behind the trunck of *vena cava*, and the *aorta*. This heat of the ſtomack is temperate, and ſomewhat moiſt, that this concoction might reſemble boyling.

Its figure

Of figure, it is round moderately; partly, that it ſhould not take too much room; partly, that it might receive much. It is ſomewhat long, and hath two orifices higher than the bottom, leſt if one ſhould have been in the bottom, the aliment uncon-cocted ſhould have iſſued out of it.

CAP. VIII.

Of the inteſtines, or GUTS.

The etymon.

THe Guts are called in Latine *Inteſtina*, in Greek Ἔντερα παρὰ τὸ ἐντὸς εἶναι. They begin at the *Pylorus*, and end in the Fundament.

They

They have a round figure, that they might contain sufficient nourishment. The figure.

They are of a membranous substance, that they might readily have constriction and dilatation. Their substance

In length, they are six times as long as the whole body. Their length.

They have three coats, one common from the *Peritonæum*, but mediately; for in the *Duodenum*, and that part of the *Colon* which cleaveth to the stomack, it proceedeth immediatly from the lower membrane of the caule; but in the *jejunum*, *ileum*, the rest of the *colon*, and thick guts, it proceedeth from the membranes of the *mensenterium*. Their coats.

They have two proper, to retaine, and expell readily: The outermost is membranous, the innermost nervous; although it seem to be fleshy, by reason of the crusty substance with which it is lined; which is framed of the Excrements of the third concoction of the guts themselves. It is also glased

sed with a mucous substance, which is nothing else but an excrementitious flegmy substance, bred in the first concoction: This furthereth the expulsion of the *fæces*, and hindereth excoriation, which might be caused when sharp humours passe thorough them.

The fibres.

This internal membrane in the small guts hath oblique fibres, but the external tranverse, because these are appointed for the retention and expulsion of the *chylus*. But in the thick guts the inner membrane hath transverse, but the outer hath oblique and straight, because they are appointed for the expulsion of the excrements. The inner membrane of the small guts is full of wrinkles, to stay the *chylus* from passing too soon. Betwen the common coat and those which are proper, the *venæ & arteriæ Mesaraicæ* march.

Their Veins.

The veins flow from the *Porta*, although not from the same branch: For the *duodenus furculus*, is sent into the *duodenum*, and the

Hæmor-

Hæmorrhoidalis, to the left part of the *colon*, and the whole *rectum*, as the *dexter meſentericus* is ſent to the *jejunum*, *cæcum*, *ileum*, and the right part of the *colon*. *Epiplois poſtica* is inſerted into the middle part of the *colon*, which marcheth tranſverſly under the ſtomack; beſides theſe, a ſprig from the *ramus epigaſtricus* of the *vena cava* is ſent to the *inteſtinum rectum*, which maketh the externall *hæmorrhoidal*.

The Arteries.

The Arteries ſpring partly from *ramus cœliacus*, partly from both the *meſentericæ*, to the *duodenum*, and the beginning of *jejunum*; a ſprig is ſent from the right *ramus cœliacus*; but to the reſt of the *jejunum*, to *ileum cæcum*, and the right part of *colon meſentericus ſuperior*: to the left part of *colon*, and to the *inteſtinum rectum*, *meſentericus inferior* is ſent. At the laſt, *epiplois poſtica*, which riſeth from the lower part of *arteria ſplenica*, which is the left branch of *arteria cœliaca*, is ſent to the middle part of *colon*, which lyeth under the ſtomack.

Nerves

The Nerves.

Nerves they have from the six paire; the *duodenum* hath sm twigs from the stomach, which g to the *pylorus*. The other guts ha very many, which spring from t branch which is bestowed upon t roots of the ribs: but the *intestin rectum*, about the *podex*, hath fou twigs from the fifth conjugation those which spring from the *os s crum*. This is the cause why so gre pain is felt in the *colon*, & *rectu* when they are ill affected.

The fat.

The guts have fat without, an not within.

The differences of the guts.

The guts are of two sorts; for the are either thin or thick.

The thin

1.

The thin, which have thinn membranes, are in number three.

The first is *duodenum*, because it thought to have 12 inches in length It doth passe directly under the sto mack, to the beginning of those gut which begin to be gathered by th *mesenterium*, for this is tyed with it.

2.

The second is *jejunum*, or th hungry gut; for in dead carcasse

it is for the moſt part found empty; partly, by reaſon of the multitude of the Veins; partly, by reaſon of the acrimony of the choler, which proceedeth pure from the liver. In length it is 12 hands breadth and three inches, and as broad as the ring finger. The internall membrane is longer then the external; for it hath innumerable orbicular, and tranſverſe wrinkles to ſtay the *chylus*. It beginneth on the right ſide, under the *colon*, where the *duodenum* endeth, and the guts being to be wreathed, and filling almoſt the whole umbilicall region, it endeth into the *ileum*; of all other guts it hath greateſt ſtore of veins and arteries; and by theſe you may know the circumſcription of it. *Meatus biliarius* is inſerted into the beginning of this gut, which ſendeth choler from the gal, which pricketh the guts to haſten expulſion.

The third is *ileum*; it hath thinner membranes than the reſt of the *tenuia*. It is ſeated under the navell,

vell, and filleth both the *Ilia*. It is th longeſt of all the guts, for in length i containeth 21. hand-breadths; bu it is the narroweſt of all, for it i but an inch in breadth. It hath few er wrincles then the *Jejunum*, an leſſer, which about the end of i ſcarcely appear.

It beginneth where both ſmalle and fewer veines appear, and endet about the place of the right Kidney where it is joyned both with th *Inteſtinum cæcum*, & *colon*. Th externall coat of the *tenuia inteſtin* is more thin and fleſhie then the in ternall. It hath tranſverſe and orbi cular fibres, with a few ſtraight t ſtrengthen the tranſverſe. The in ternall coat it hath partly ſtraight partly oblique fibres: yet fewe ſtraight then the *craſſa inteſtin* have. Theſe guts have a motion ſuch as worms have when they crawl, o leeches when they ſuck, to draw downward the *chylus*: for it is not in our power to ſend this away, as we do the excrements. The *craſſa inte-*

ſtina

ſtina have not this motion and by reaſon of this motion the upper part of the gut may be wrapped in the lower, which cauſeth the ſickneſſe called *ileos* or *convolvulus*.

Now follow the *inteſtina craſſa*, the great guts; they are three in number alſo. The thick guts.

The firſt is called *cæcum* τυφλὸν, the blind gut, becauſe one end of it is ſhut, ſo that at the ſame orifice the *chylus* paſſeth, and returneth. In man it is like a thick round worm coyled together. It is bigger in an infant than in a man; four inches in length, and one in breadth. It is not tyed to the *meſenterium*; but being couched round, it is tyed to the right kidney. In ſound perſons it is allwayes empty. In four-footed beaſts it is alwayes full of excrements. Apes have it larger then a man, Dogs larger than Apes; but Conies, Squirrels and Rats, largeſt of all, if you conſider the proportion of their bodies. 1.

The ſecond is *colon*, κῶλον, παρὰ τὸ κωλύειν 2.

κωλύων, becauſe it detaineth the excrements it hath its beginning from *ileum & cæcum*, and mounting up by the *dextrum illium*, when it comes to the liver, it paſſeth tranſverſly under the ſtomack of the left *illium*, and from thence to the beginnning of *os ſacrum*.

It is tyed for the right kidney in the right ſide, by the externall membrane; then in the middle to the bottom of the ſtomack, and at the laſt under the left kidney. In length, it is of ſeven hand-breadth and ſeven inches. It is the broadeſt of all others that it might contain all the excrements.

It hath cells which ſpring from the internall tunicle of it: Theſe cels are kept in their figure by a ligament halfe an inch broad, which paſſeth through the upper and middle part of it all alongſt; this being broken or diſolved, the cels appear no more. The uſe is to hinder the flowing of the excrements in one place, which would compreſſe the parts adjacent.

It

It hath a valve where it is joyned with *ilium*, like to the *Sigmoides* in the *Sinus* of the heart. This valve ſo ſtoppeth the hole which is common to the *ileon* and *colon*, that flatuoſity cannot aſcend to the *ilium*, much leſſe excrements regurgitate. If one would find this out, let him poure in water into the *Inteſtinum rectum*, and hold up the guts: The water will ſtay when it comes to the valve, if it be found. If this valve be relaxed by ſickneſs, excrements may regurgitate; and expelled by vomit and clyſters, alſo come to the ſtomack.

The third is *inteſtinum rectum*, the ſtreight gut: it hath its beginning where the *colon* endeth, and endeth where it maketh the *anus*: it is of a ſpan in length, not ſo wide as the *colon*, the muſcle σφιγκτὴρ is at the end of it: It hath thick and fleſhie externall coats, and ſo a ſolution of unity in it may the ſooner be united. It hath many tranſverſe fibres, few oblique, and ſome ſtreight. It hath veins not from 3.

Porta only as the reſt; but from the trunck of the *Cava* deſcending alſo, which make the externall Hemorrhoidall.

The guts have a threefold uſe; for firſt, they all concoct the *chylus* ſent from the ſtomack better.

Secondly, the ſmall guts digeſt the *chylus*

Thirdly, the thick guts expell the excrements.

CAP. IX.

Of the Meſenterium.

THe ſubſtance is membranous; Firſt, that it might be light, and ſhould not preſſe together the veſſell by its weight: Secondly, that it might be extended into all dimenſions, by reaſon of the fibres: Thirdly, that between the membranes it might the more readily gather fat.

It is of a circular figure, which is moſt capable, that it might anſwer the length of the guts, and keep

keep them within a ſmall compaſſe and place likewiſe.

It is framed of two proper membranes, one above another, ſtrong enough; and one common, between which and the proper, the veſſels paſs ſafely to the guts.

The veins are called *Meſaraicæ*, theſe ſpring from *ramus meſenteri-cus, dexter & ſiniſter*, branches of the *Vena Portæ*.

It hath alſo two arteries, the one ſuperior, the other inferior, branches of the *arteria meſenterica*, which paſs as the veins doe.

As for the nerves, it hath two on each ſide, ſpringing from the branches of the ſixth pair, which goe to the roots of the ribs; others it hath from thoſe which ſpring from the *ſpinalis medulla*, between the firſt, ſecond, third and fourth *vertebra* of the loynes.

That the veſſels might paſſe ſafely without ruption, Nature hath placed glandules between the divarications of the veins and arteries. Glandules.

The biggest.

The biggest of these is about the center of the *mesaræum*, where the distribution of the vessels beginneth.

If this become scirrhous, the extenuation of the whole body ensueth, because the passing of the *Chylus* is hindered: leane persons have larger glandules than the fat, because the fat doth sufficiently guard the distribution of the vessels, and preserveth the heat of the vessels.

The arteries bring spirit; but the veins doe bring both the *Chylus* to the liver, and nourishment to the inner parts; but not at the same time: As we take breath by, and let it out by the same instruments, but not at the same time: see *Galen.* 2 *facult. nat.* 13. & 4. *de us. part.* 14. So at one time the liver draweth from the belly, and at another time the belly from the liver. When the guts are full, the *Chylus* is sent to the liver; but when they are empty, they draw nourishment.

It hath two parts, *Mesaræum*, μεσάραιον, ὅτι μέσον τῆς ἀορτίου ἐντέρου

ὅτι

ὄζι, and μέσεντέρον, quasi μέσον τῶν κώλων: The first tyeth the small guts together; the second the thick.

The *Mesaræum* is in the circumference three yards, but a span in bredth.

The bigneſſe of the *Mesaræum*

Its beginning.

It springeth from the ligaments of the *vertebræ* of the loynes, by two roots, the largeſt about the firſt *vertebra*; the other leſſer about the third. It was fit that it ſhould be tyed ſtrongly to theſe ligaments, leſt it might have been torne by violent motions, or be pulled from thence by the weight of the guts being full.

And as plants draw their nouriſhment by their roots from the earth, ſo living creatures which have blood, draw their nutriment from the guts, by the meſaraick veines. Wherefore leſt they ſhould ſuffer ruption, Nature would have them to paſſe ſafely between membranes.

The uſe of it then is to carry ſafely the veſſels which paſſe to the guts.

It is tyed before to the ſmall guts; but behind to the firſt and third *vertebræ* of the loynes from whence it ſpringeth.

It is called μεσέντεριον & μεσεντέριον, *quaſi* μέσον τῆς ἐντέρων.

Meſocolon Μεσοκῶλον is that by the which the thicke guts are tyed together. *Hippoc. 6. Epid. & Galen. 4. Aphor. 6.* make mention of this. It is tyed in the right ſide to the right part of the *ileum*; but in the left ſide to the left part of the *ileum*, and the muſcle *pſoas*: before it is tyed to the *colon*, & *rectum inteſtinum*.

CAP. X.
Of the Venæ lacteæ.

THis is the opinion of all the ancient and modern Writers, concerning the meſenterie, and the meſeraicall, if you except *Caſpar Aſellius*, who by his diligence found theſe veines, which hee calleth *lacteas*, becauſe they contain a white juyce, which is nothing elſe but

Why ſo called.

hut the *chylus* elaborate, which they carry from the ſmall guts to the liver.

Their beginning ſeemeth to bee in the *Pancreas*, for there they all meet, and are ſtrangely implicate and twiſted together: from thence they paſſe upward to the liver, and downward to the ſmall guts: ſo that the *Pancreas* is a more excellent part than it hath been hitherto taken by other Anatomiſts: and as the mothers blood before it be ſent by the *vaſa umbilicalia*, to nouriſh the infant, is firſt committed to the *placenta uteri*; to draw from it all impurity: ſo then theſe *venæ lacteæ* diſcharge their impurities, before they carry the *chylus* to the liver in the *Pancreas*. Their beginning.

They are inſerted into the ſmall guts, and have nothing to doe with the ſtomack. They paſſe into the capacity of the guts, and end in the wrinkled cruſt, with the which the internall membrane of the guts is lined, with their ſpongious heads like to Leeches, by which they Their inſertion.

draw to themſelves the *chylus*.

Their progreſs.

From the ſmall guts, they march between the two membranes of the *meſenterium*, ſometimes ſevered from the other veſſels, ſomtimes joyned with them, ſomtimes directly, ſometimes over-riding them, making a Saint *Andrewes* croſſe thorow the *glandules*, until they come to the *Pancreas*, where they are inexplicably twiſted one with another : from thence having greater branches they paſſe by the ſides of *vena portæ* to the cavity of the liver, where they are ſpent by ending there by ſmall twiſts : and ſo it is moſt likely that ſanguification is performed by the ſubſtance of the liver, and not by the veins : the groſſer part of it being ſent to the branches of *vena portæ*, and the ſubtileſt to the branches of *vena cava*.

The difference between them & the ordinary meſaraicall veins.

They differ from the ordinary meſaraicall veins;

Firſt, in bigneſſe; for theſe are bigger, but thoſe are more in number; for they are twice as many : for

for more *chylus* must be sent to the liver to make blood of, for the nourishment of the whole body than blood for the nourishing of the inward parts only.

Secondly, the valves which are seen about the endings of these, are placed from without inwards, but of these from within outwards. The reason of this diversity is this: the *venæ lactæ* suck the *chylus* from the guts, which ought not to returne; but the ordinary mesaraicall send blood, and sometimes excrementitious humours, which ought not to come back again. Their valves.

If you would finde out these veins, you must feed a dogge with milk, and five or six hours afterward dissect his belly; then by stretching the mesentery you shall perceive them. How to find them out.

That the Ancients did not finde out these veins, the cause is, either because they dissected beasts after they were dead, or after that the *chylus* was distributed, or they did presently take a view of the mesentery; Why the Ancients did not finde these out

meſentery; but made ſome ſtay about the inſpection of ſome other part.

Why they have no trunck.

They have no trunck, becauſe they were to end in the liver, and to goe no further; from this part many diſeaſes ſpring: firſt, becauſe it is compoſed of two membranes, having innumerable veines and arteries, and ſo it may containe many impurities: ſecondly, becauſe it hath many glandules, which as a ſponge imbibe ſuperfluities.

Cap. XI.

Of the Pancræas.

IT is called παγκρέας and καλλικρέας. It is the biggeſt glandule of the whole body, and very red, like unto ſoft fleſh, from whence it hath its name.

In figure it is ovall, three or four inches in length. It is placed in the left ſide towards the ſpleen; above the ſtomack reſteth upon it; below, the membranes of the *peritonæum*

ritonæum lie, unto which it is firmly tyed; it doth keepe within it selfe *ramus splenicus*, the left branch of *arteria cœliaca*, the nerves which passe from the sixth paire to the stomack and the *duodenum*.

It hath a membrane from the *peritonæum*, by the which it is covered and holden up.

It hath three uses. First, it stayeth the liver, lest it being distended by too much meat and drink, should be hurt by the hardnesse of the *vertebræ* of the back.

Secondly, to keep the vessels passing through it from ruption.

Thirdly, to keep these same from compression, when the stomack is too much stretched by meat and drink.

CAP.

Cap. XII.

Of the Liver.

Now follow the parts appointed for ſanguification, whereof the Liver is the chiefeſt.

THe ſubſtance of the Liver ſeemeth to bee a red fleſhy maſſe. In the firſt formation of the birth it is framed of blood wizing out of the veines, and there coagulating about them.

The ſubſtance of the Liver is ſo ſet about the branches of the *vena porta* and *cava*, that it filleth up all cavities, and doth firmly ſtay them, keeping them open from purſing together, and in comely order, that they be not confounded. It is the thickeſt and heavieſt of all ther entralls.

Its bigneſs.

It is bigger in man than any other living creature, , if you conſider the proportion of his body; for it was fit ſo to be, ſeeing man was

was to have the greateſt ſtore of blood, leſt ſpirits ſhould faile in performing the functions of the ſoule, wherewith man is moſt copiouſly furniſhed. Beſides, ſeeing he hath but one *Liver*, the bigneſs was to recompence the number: we may gheſſe of the bigneſſe of it by the bigneſſe of the fingers.

It is covered with a very thin membrane, which ſpringeth from the ſecond ligament of the Liver, which cleaveth firmly to the ſubſtance of the Liver. If it be ſeparate at any time by a watriſh humour, iſſuing out of the veſſels from the fleſhie ſubſtance, watriſh puſtules, by the Græcians called ὑδατίδες, are ingendered. If theſe doe breake, the water falleth into the cavity of the belly, and cauſeth that kind of dropſie called *aſcites*.

It hath veins as well from the *cava* as the *porta*.

The branches of the *cava* are diſtributed for the moſt part thorow Its veins.

row the gibbous part; but those of the *porta*, into the hollow part: yet so that the branches of both are joyned by inosculation to deliver the purest blood to the *vena cava*, for the nourishment of the vitall parts; and the grossest by the branches of the *porta*, for the nourishment of the naturall. There seemeth to be three times more of the twigs of the *porta*, than of the *cava*, within the liver.

Amongst the midst of the branches of the *porta*, some little veins march; which afterward becomming one twig, end in the *vesicula fellea*, that the bilious humour may be sent to it, before the blood enter into the *vena cava*.

Its arteries.

It hath onely few arteries, which springing from the right branch of the *cœliaca*, end in the hollow part of the liver, where the *vena porta* commeth out.

Its nervs.

It hath two nerves, but very small, because it hath but a dull sense. One commeth from the branch which is sent to the upper orifice

orifice of the ſtomack, the other from that branch which is diſperſed thorow the roots of the ribs of the right ſide.

As for the figure of it, it is almoſt round, the upper part is arched and ſmooth, and ſo framed, that it might not hurt the *diaphragma*. Its figure

The lower part is hollow to receive the ſtomack, which is of a ſphericall figure.

In the upper and convex part, which is diſtant but one inch from the *diaphragma*, to give way to it when it is dilated in breathing and to the ſtretching of the ſtomack: it is tied firſt to the *diaphragma*, by a ligament membranous, broad, and ſtrong, which ſpringeth from the *peritonæum*, where it covereth the midriff in the lower part. It paſſeth tranſverſly by the Liver, to the hinder parts; by this ligament, it is ſtayed from falling downe. It is called the Suſpenſory Its ties.

Secondly, in the fore-part it is ſtayed

ſtayed by two ties; by the firſt it is tied to the *mucronata cartilago*, to hinder it from falling to the back parts when we ſtretch our back: this ligament is broad, double, and ſtrong, and ſpringeth from the *Peritonæum*, and giveth the Liver its coat. Into this coat the two ſinews are implanted, according to *Galen lib.* 3. *de loc. affect. cap.* 3. and not into the ſubſtance of the Liver; ſo that, according to *Galen.* 4. *de uſ. par. cap.* 13. it hath but a dull feeling, ſuch as plants have to embrace that which is profitable, and to leave that which is unprofitable.

By the ſecond it is tyed to the navell: this is the umbilical veine, which when the Infant is born, loſeth its hollowneſſe, and becommeth a ligament. This ſtayeth it from being pulled upwards.

Thirdly it is tyed to the ſhort ribs, by ſmall fibres, to keep it ſteady. In the hollow part it is tyed by the *meſenterium*, to the ribs by the *vena cava*.

It

It differeth from the Liver of beasts, in that it hath seldome any lobes; yet the hollow part of it hath a fissure, or chink, wherein the umbilicall veine is implanted, and two small bunchings out in the right part, where the *Vena portæ* marcheth out, which *Galen* calleth πύλας, gates. Its differences from the Liver of beasts

Besides these, there is a little lobe of a softer and thinner substance than is the rest of the Liver, and is covered with a membrane: It is tied to the *Omentum* by this lobe, by the which *Spigel. de human. corp. fabric. lib.* 8. *cap.* 12. thinketh that waters may be discharged out of the Liver into the caul. A little Lobe.

It is placed in the lower belly, in the right side, covered with the ribs for safety, and in the middle of the trunck of the body, to send blood equally to the upper and lower parts. The stomack is cherished by it, and the spleen; but becaus it is a more noble part than the spleen, it is placed in the right *hypochondrium*. Its situation.

The

Its action

The proper action of it is not only to further ſanguification, perfected in the veines, as all ancient Anatomiſts averr; but to ſanguifie the *chylus*, carried to it by *venæ lacteæ*, as *Aſellius* hath proved.

A note.

One thing is to be noted, that the ſubſtance of the Liver, in the convex part, where the *vena cava* is lodged, is ſofter than that which is in the hollow part, where the *vena portæ* is: for there it may be more eaſily ſeparate from the veſſels, than here; and not without cauſe: for the roots of *vena portæ* ought to bee ſtayed by a harder ſubſtance, that they be kept wider; but the roots of the *cava* with a ſofter, that they might the readier be filled, ſtretched, and ſlacked.

CHAP.

CHAP. XIII.

Of the vena portæ.

SEeing the roots of the veins which Nature hath appointed to furniſh blood, the nutriment of the body, have their roots in the Liver: having diſcourſed of it, method doth require to ſet down the doctrine of them.

Although there is but one artery to impart life, yet there are two veins, the *vena portæ* and *cava*. Becauſe ſome require a groſſer blood for nutrition, as thoſe parts are which ſerve, the liver, the gal, the ſtomack, the ſpleen, the *Pancreas*, the *omentum*, the guts, and the meſentery. For unto the reſt, as the kidneyes, bladder and thoſe which are appointed for procreation, the *vena cava* ſendeth branches. The veins of it.

It is fit to begin with the *vena portæ*, becauſe it goeth no further then to the parts, contained in the abdomen *Vena portæ.*

abdomen, and not to all those neither.

Why so called.

It is so called, because it seemeth to enter into the liver by the two fleshy bunches called *portæ*, gates.

How it differeth from *Vena cava*.

This doth differ from the *vena cava*.

First, in substance; for the substance of this is thicker and blacker, because it is nourished with thick and black blood; but that of the *vena cava* is whiter and thinner because it is nourished with a thinner and redder blood.

Secondly, the substance of the *vena portæ* is harder then that of the *cava*; which ought to be softer, because it ought to be more apt for dilatation and constriction; first, because it containeth more moveable blood; partly because its thinner, having much serosity mingled with it; partly, because for the most part the branches of it are accompanied with the branches of the great artery, whereas the branches of the *porta* are

are far enough off, if you except *ramus ſplenicus*.

Thirdly, the trunck of *vena cava* is larger then that of *portæ*, becauſe it nouriſheth more parts, as hath been ſaid.

Fourthly, the *portæ* hath more roots within the ſubſtance of the liver than the *cavæ*.

The roots of the *venæ portæ* and *cavæ* are joyned by the unition called *anaſtomaſis*, or inoſculation. This is performed by two wayes; Firſt, when the ending of one doth meet with the end of the other; as the *epigaſtricæ venæ* meet with the *mammariæ* in the lower ſide of the *muſculi recti*. How inoſculation is performed.

Secondly, when one branch reſting upon another, does cleave together, having a hole in the middle; this inoſculation is ſeen in the roots of the *venæ portæ*, and the *cavæ*.

One thing is to be noted, that there are many of the twigs of the *venæ portæ* which touch not thoſe of the *cavæ*; becauſe the pureſt A note.

part

part of the blood was only to b
carried to the *vena cava*, and th
thickeſt to remain in the *vena portæ*
By reaſon of theſe *Anaſtomaſes* i
famine nouriſhment is ſent from th
habit of the body by the *vena cava*
to nouriſh the internall parts.

Bauhin affirmeth, that there i
a common conduit to the roots o
vena portæ and *cava*, which in i
cavity will receive a ſmall probe
In theſe veines, beſide blood, ex
crementitious humours are alſ
contained in diſeaſed perſons
which ſometimes are ſent from th
whole body by the *vena cava* into
the guts, and ſometimes commu
nicate to the *vena cava* by *vena*
portæ.

How the inoſculation of theſe veines is found out.

To finde out the radication an
inoſculation of theſe veines, yo
muſt boile the liver untill it be
come ſoft, and ſo with a woodde
or bone knife ſeparate the ſubſtanc
from the veſſels; for a ſharp knife i
not fit.

Now to come to diſtribution o
vena

vena portæ, it hath parts: 1 *Radices*, the roots. 2. *Truncus* the trunck. 3 *Rami*, the branches. 4. *Surculi*, twigs.

The distribution of *Vena portæ*.

As for the roots first from the circumference of the Liver smal capillar veines march toward the inner part of it, and by combination becomming greater, they make up five branches. These about the middle of the hollow part, yet towards the back joining together, make up one root, which at the last comming out of the liver, about the eminences, called *portæ*, frame that trunck which is called *vena portæ*.

Its roots.

This trunck parting a little from the liver, before it be severed into branches, it puts forth two twigs; the one being not smal and springing from the upper and forepart of the trunck, as soon as it parteth from the liver, is inserted into *Cystis fellis*, about the neck of it, and spread by innumerable twigs, through the externall coat of it.

Its branches.

Vesalius affirmeth, that there be

two of these twigs, from whence some call them *cysticæ gemellæ*: but this is matter of no great moment. This twig may be called *furculus cysticus*, or *vesicalis*.

The second twig is bigger, but lower. This springeth from this same forepart, yet towards the right side, and is inserted into the bottom of the stomack: from hence it sendeth many sprigs toward the hinder-part of it, towards the back.

It may be called *Pistoricus*, more properly then *Gastricus*, seeing there are other branches, which are called *Gastrici*. Having sent forth those two twigs, the trunck passeth down, and binding still a little towards the left side, it is parted into two remarkable branches: whereof the one is called *sinister*, or the left, seated above the right, but lesser: the other is *dexter*, or the right, lower then the left, yet larger: the left is bestowed upon the stomack, the *omentum*, a part of colon, and the spleen: the right is

is spred through the guts, and the *mesenterium*; the left is called *vena splenica*, but the right, *vena mesenterica*.

The *vena splenica* hath two branches before it come to the spleen, the superiour and the inferiour.

Branches of *Vena splenica.*

The superour is called *gastricus*, or *ventricularis*. This is bestowed upon the stomack; the middle twig compassing the left part of the orifice of the stomack like a garland, is called *coronaria*: from the lower branch two twigs doe spring, the one is small; this doth send other twigs to the right side of the lower membrane of the *omentum* and to the colon annexed to it. This is called *epiplois*, or *omentalis dextra*; the other is spent upon the lower membrane of the *omentum*, which tieth the colon to the back, and upon that part of the colon it is called *epiplois*, or *omentalis postica*: when the *ramus splenicus* hath approached to the spleen, it doth send out two other twigs, the uppermost and the lowermost: from the

uppermoſt *vas breve* ſpringeth, which is implanted in the left part of the bottome of the ſtomack commonly: from the lowermoſt two twigs iſſued.

The firſt is called *gaſtroepiplois ſiniſtra*, this comming from the lower part of the ſpleen towards the right ſide, is beſtowed upon the left part of the bottome of the ſtomack, and the upper and left part of the *omentum*.

The ſecond ſpringeth moſt commonly from *ramus ſplenicus*, but ſeldome from the ſpleen; and paſſing along according to the length of the *inteſtinum rectum*, it is inſerted into the *anus*, by many twigs. This is called *Hæmorrhoidalis interna*, as that which ſpringeth from the *vena cava* is called *hæmorrhoidalis externa*.

Vena Meſenterica.

Now followeth *vena Meſenterica*, or the right branch of *vena porta* before it be divided into branches, it ſendeth forth two twigs.

The firſt is called *gaſtroepiplois ſiniſtra*

siniſtra, this is beſtowed upon the right part of the bottome of the ſtomack, and the upper membrane of the caule.

The ſecond is called *inteſtinalis*, or *duodena*: It is inſerted into the middle of the *duodenum*, and the beginning of the *jejunum*, and paſſeth according to the length of them. This branch, as ſoon as it paſſeth from the back, it entereth into the *meſenterium*, and paſſing between the membranes of it ſendeth forth thoſe meſeraicall veins, which ſend nouriſhment to the inward parts.

It is divided into two branches, to wit *Meſenterica dextra*, & *ſiniſtra*: *Meſenterica dextra*, placed in the right ſide, ſendeth a number of branches to feed the *jejunum cæcum*, and the right part of the *colon*, which is next to kidney and liver.

It hath fourteene remarkable branches, but innumerable ſmall twigs. One thing is to be noted, that the greater branches are ſup-

ported by the greater glandules, and the ſmaller by the ſmaller glandules. *Meſentericus ſiniſtræ* paſſeth through the middle of the *meſenterium*, and that part of *colon* which paſſeth from the left part of the ſtomack, to the *inteſtinum rectum*.

Its uſes. The chief uſe of the *vena portæ* is, to nouriſh the parts which are appointed for nutrition, with thick and feculent blood: It ought to be thick, that it might be the hotter; for heat in a thick body is more powerfull.

The ſecond uſe is to further the ſanguification of the liver.

CHAP. XV.

Of the Vena cava diſperſed within the trunk of the body.

WIthin the trunk of the body, the *vena cava* hath two trunks; one called *aſcendens* or going up, the other *deſcendens* marching down.

The

The *aſcendens* paſſing through the nerves, part of the *Diaphragma*, it marcheth upward undivided, until it come to the *jugulum*: yet by the way from its ſide it ſendeth two twigs.

Its ſprigs

The firſt is *Phrenica*; this is inſerted into the Middriff and heart; from hence ſpringeth the *coronaria vena* which compaſſeth the baſis of the heart as a garland.

1.

The ſecond is *vena ſine pari*, ſo called, becauſe it hath not a fellow in the left ſide, as other veines have. It doth ſpring about the *vertebra* of the breſt, from the hinder part of the *vena cava*, in the right ſide. This going down, it marcheth towards the *Spina*: when it is come to the eighth or ninth rib above the *Spina*, is is divided into two branches, to wit, the right and the left; the left is inſerted moſt commonly in the middle of the left emulgent vein. By this branch, blood, or wateriſh or purulent matter may be diſcharged by urine; the right twig is implanted

2.

The branches of *Vena ſine pari.*

either into the trunck of the *cava*, or into *prima lumbaris*.

This being done, the *vena cava* ascendeth up to the *Jugulum*, being strenghthened by the *Mediastinum*, and the glandulous body called *Thymus*. Here the *Vena cava* is divided into two remarkable branches, from whence those veins spring which are sent to the head, to the armes, and some muscles of the *abdomen*. One passeth to the right side, the other to the left; the one is called *subclavius*, because it marcheth under the cannel bone within. The other is called *axillarius*, when it is come to the arm-pit; from the upper part of the *Ramus subclavius* two remarkable branches proceed: the internall and externall jugular; in man the internall is biggest, but in beasts the externall.

The branches of *Ramus subclavius*.

The internall jugular commeth out about the articulation of the cannel-bone with the *Sternum*; then it joyneth it self with the soporall artery, and the recurrent nerve;

nerves and with its hinder and greatest branch, accompanied with the ſoporall arterie it entereth with the *cranium* at the hole of the *occiput*, by the which the ſixth paire of nerves commeth down, it entreth into the firſt and ſecond *ſinus* of the *dura mater*.

The externall jugular mounteth up to the eare under the skin, and the quadrat muſcle which pulleth down the cheek alongſt the neck: from this branch ſpring the veines which are opened under the tongue.

From the lower part of *ramus ſubclavius*, ſpring great branches.

The firſt, *Intercoſtalis ſuperior*, one on each ſide; it is ſmall, and commeth out about the root of the bifurcation: then paſſing downe by the roots of two ribs, it beſtoweth twigs upon the diſtances of theſe two ribs.

The ſecond is *Mammaria*, this marcheth forwards towards the upper part of the breſt bone: then it goeth downe by the ſides of it,

2.

Springs ſpringing from the lower part of *Ramus ſubclavis*.

and when it is come to *cartilago macronata* about the sides of it, it commeth out : from thence it passeth straightwaies under the right muscle to the navell, where by an *anastomasis* it is joyned with the *epigastrica ascendens* : from hence commeth that great consent between the matrix and paps.

The third is *Mediastina*, because it is bestowed upon the *mediastinum*, together with the left nerve of the *diaphragma*, according to its length.

The fourth is *Cervicalis*, or *Vertebralis*. This passing thorow the holes of the tranverse processes of the *vertebræ* of the neck, is bestowed upon the muscles of the neck which are next to the *vertebræ*.

CHAP.

CAP. XV.

Of the Gall.

THe Gall, called in Latine *vesica biliaria*, or *Folliculus fellis*, is a dissimilary part, in figure representing a peare, hollow and appointed to receive the thin yellow choler. The description of it.

It is about two inches in length.

By its upper part it is tied to the liver, which doth afford it a hollowneſſe to receive it; but the lower part which hangeth without the liver, it reſteth upon the right ſide of the ſtomack, and the *colon*, and doth often die them both yellow. Its bigneſſe. Its connexion.

It hath two membranes, the one common, which is thin and exterior, without *fibres*. This ſpringing from the membrane of the liver, it onely covereth that part which hangeth without the liver; The other membrane is proper. Its membranes.

This

The fibres of the proper membrane.

This is thick and ſtrong, and hath three ſorts of Fibres, the outtermoſt are tranſverſe, the middlemoſt oblique, and the innermoſt ſtraight.

This membrane is harder and thicker in the neck; but thinner in the bottome. Within, it hath a mucous ſubſtance, engendred of the Excrements of the third concoction of the membrane, to withſtand the acrimony of the choler.

The parts of it.

It hath two parts, the neck and the bottome.

The neck is harder than the bottome, and higher in ſituation.

It from the bottome by degrees growing narrower and narrower, at laſt endeth in the *Ductus communis*, or the common paſſage of the choler, to the beginning of the *Jejunum*.

This elongation of the neck of the *viſcula fellea*, is called *meatus cyſticus*, becauſe it ſpringeth from the *Cyſtis*.

The choler is carryed to the neck of

of the *cystis* by many small veines, near to the roots of the *vena portæ* about the midst of them, and is discharged into the cavity of it about the upper part.

How the choler is carried to the gall.

The *meatus cysticus* hath three valves; looking from without inwards to hinder the recourse of the choler to the Liver.

Its valves

The other passage which carryeth the thick and corrupt choler, as that which is called *vitellina ærumnosa*, *porracea*, &c. is called *meatus hepaticus*; because it passeth straight away from the Liver to the *ductus communis*.

Meatus hepaticus

This passage hath no Valves; both these discharge their colour by the common passage into the beginning of the *Jejunum*, when the small guts are discharged of the *Chylus*.

Beasts which want the *vesica fellea*, have this *meatus hepaticus*, as Harts, Hynds, and follow Deer, and those which have a whole hoof.

What beasts have this passage onely.

The *Meatus hepaticus* passeth thorow

throw the roots of the *vena cava*, by innumerable branches, which being gathered together become one branch; and being united with the *meatus cysticus* make up the *communis ductus*, which is inserted into the beginning of the *jejunum* obliquely, between the two membranes of the intestine, about the distance of two inches, before it perforate the second membrane.

The *vesica fellea* hath for nourishment called *cysticæ gemellæ*.

Its vessels.

For life it hath sprigs of arteries proceeding from the *Cæliaca*. To afford sense, it hath a small threed like a sprig of a sinew from the sixth paire.

Of the stones in it.

Many times stones are found in it, but they being lighter then those of the bladder, swim above the water.

The use of the passages. The uses of the choler.

The use of these two passages, is to draw all superfluous choler from the *chylus*, and to returne it into the guts, where it affordeth benefits to nature:

For first by its sharpnesse it moveth

veth the inteſtines to turne out the terreſtrial excrements in due ſeaſon.

Secondly, by reaſon of its thinneſſe it doth cut and clenſe the ſmall guts of flegme, which there is plentifully bred. 2.

Thirdly, by reaſon of its drineſſe it hindereth the encreaſe of putrefaction. 3.

Fourthly, it furthereth concoction in the inteſtines by encreaſing their heat: nevertheleſſe, naturally there can be no paſſage to carry choler to the bottome of the ſtomack. 4. Why choler is not carryed to the ſtomack.

For firſt, by reaſon of its acrimony it would corrode it 1.

Secondly, it would cauſe the crude nouriſhment to paſſe into the *duodenum.* 2.

Thirdly, it would procure perpetuall vomiting. If it fall out that choler be carried to the bottome of the ſtomack by any paſſage than this, the party vomiteth choler, and is termed πικρόχολος ἄνω, but if it be inſerted into the end of the *jejunum*, then 3.

then bilious dejections follow : and such a one is termed περιόχολος κάτω.

A note.

One thing I would have you observe ; that the *porus biliarius* passeth by a straight course to the *ductus communis*, and not to the *vesicula fellea*, which thus you may show : put a *catheter* into the necke of this passage neere the liver, the guts will be blowne up, and not the *vesicula*. Againe, put the *catheter* into the common passage, and both the *cystis fellis*, and the *meatus cholidecus* will be blowne up.

How the valvs are found out.

If you would finde out the three valves of the *vesicula fellea*, presse the choler with your fingers from the bottome towards the neck ; where you finde the choler to stay, there the valves are.

CHAP.

Cap. VI.

Of the ſpleen.

THe ſpleen or Milt in Engliſh, in Greek is called *Splen*, and *Lien* in Latin.

The ſubſtance of it is flaggie, looſe and ſpungeous, net-like, which is the cauſe that it might imbibe much ſuperfluity, and ſo become exceedingly ſwelled. Its ſubſtance.

This ſubſtance is covered with a membrane borrowed from the *Peritonæum*, whtch is inſerted firſt into the ſtraight line of the Milt, and then covereth the whole ſpleen: It is thicker then that of the liver. Firſt, becauſe it hath a looſer ſubſtance. Secondly, becauſe it hath more arteries, which require a ſtrong membrane to defend them. The ſtraight line is in the hollow part where the veſſels of the Spleen doe enter into it. Its membrane

In infants new born it is of a red Why it is red in Infants.

red colour, becauſe they have been fed with elaborate blood; but in thoſe of a ripe age it is ſomewhat blackiſh: being boiled it repreſenteth claret wine. In man it is bigger, thicker, and heavier, then the beaſts; for it is ſix inches in length, three in bredth, and one in thickneſſe; yet according to *Ariſtotle*, 3. *hiſt. Animal.* 6. a convenient little one is better then a big one

Its figure

In figure it is ſomewhat long, like an Oxes tongue,

Its ſituation.

It is ſeated in the left *hypochondrium*: ſo *Hippocrat.* 6. *Epidem.* calleth is the left liver; and *Ariſtot.* 3. *part. animal.* 7. the baſtard liver, but it ſeated ſomewhat lower, becauſe it was to draw the terreſtriall part of the *Chylus*, before it come to the liver by *ramus ſplenicus*, that the blood may be made thinner and purer; for ſuch blood cauſeth men to be wiſer, 2. *de part. anim.* 2. it is touched within and under the ſhort ribs; ſo that in healthfull perſons it cannot be felt; only

onely if it be inflamed, a pulsation may be felt.

It is tyed to five parts; to the midriff and left kidney by small membranes, by its hollow part which giveth way to the stomack, being distended to the upper membrane of the *oment um*, and to the stomack by *vas breve*. In its arched part it is tied to the back, so that dints remain in it by the impression of the ribs. Its connexion.

It hath veins for nourishment from *ramus splenicus*; for life it hath arteries from *ramus cœliacus sinister*; but five times more than veins, for great heat is required for the elaboration of thick blood. These vessels enter into the spleen where the streight line is in the hollow side. They joyn often by *anastomases*. Its vessels.

The arteries besides life afford unto the spleen two benefits. The uses of the arteries of the *spleen* 1.

First, they increase their naturall heat of it, that it may the better concoct the grosser part of the *Chylus*,

Chylus, which is ſent unto it by the *ramus ſplenicus*.

Secondly, they further the expulſive faculties of it.

By what ways the Spleen ſendeth its ſuperfluities to the Kidneyes

Now the ſpleen ſendeth its ſuperfluities to the kidneyes by two wayes.

1. First, by returning of them by *ramus ſplenicus* to the *vena portæ*, and from thence to *vena cava*, from whence they are ſent to the emulgent veines.

2. Secondly, by a ſhorter paſſage they are ſent from *arteria cœliaca* to the *aortæ*, and from thence to the kidneyes by the emulgent arteries.

Laſt of all, it hath ſmall twigs of nerves from the ſixth pair, which are beſtowed upon the inveſting membrane, but are not communicate to the ſubſtance: wherefore it muſt be but of a ſmall and dull feeling: ſo that the paines which ſundry aſcribe to the ſpleen, are to be referred to the adjacent parts.

The uſe of the Spleen.

The uſe of the ſpleen, as alſo of the

the liver, is to further the elaboration of the concoction of the *Chylus*: for it is a baſtard liver, according to *Ariſt. 3. de Hiſtor. animal. 7.*

The ſanguification of the ſpleen differeth in two points from that of the liver.

How the ſanguification of the ſpleen differeth from that of the Liver.

Firſt, in the materiall cauſe; for the ſpleen maketh groſſe blood of the more earthly part of the *Chylus*; but the liver farre purer of the thinner and more benigne part of the *Chylus*.

Secondly, it differeth in the finall cauſe; for the liver ſanguifieth to afford nouriſhment both to the vitall and animall parts; but the ſpleen only to maintaine the naturall parts, and not all of them neither.

2.

Why the naturall parts are nouriſhed with groſſe blood.

Nature would have the naturall parts to be furniſhed with groſſe blood by the branches of *vena portæ*, partly to encreaſe their heat; for heat in a thicke body is ſtronger; partly to afford them nouriſhment anſwerable

ſwerable to their ſubſtance, for it thick.

Of the kidneyes.

CHAP. XVII.

Their denomination.

THe kidney is called in Latin *Re* from ῥέω, to flow; becauſe th ſeroſity of the blood doth flo through the kidneyes to the ureter and from thence to the bladder.

Their number.

They are in number two, not ſ much for the poiſing of the body as for their uſe and neceſſity; tha one being ſtoppped, yet the cleanſin of the blood might be performed b the other.

Their places.

They are ſeated in the loyne under the liver and ſpleen, and re upon the muſcles called ψοαι, which move the theyght about thei heads, under the which large nerve are couched. which is the cauſe that a big ſtone being in the kid-ney, a numneſſe is felt in the foo

of

of this side the muscle ~~the~~ being pressed down by it: They lie behind the guts. The right kidney hath the *cæcum*, but the left the *colon* above it: in man the right kidney is lowest, by reason of the greatness of the liver, and bigger also then the left, yet it is not so fat as the left, by reason of the vicinity of the liver; whose heat hindereth the encrease of fat.

Their figure.

In figure they resemble the *asarum* leafe or kidney beane: towards the loyne they are gibbous, but hollow towards the guts.

Their connexion.

As for their connexion, by the external fat membrane they are tied to the *diaphragma*, and the loynes; by the emulgent vessels of the *vena cava*, and the *aorta*, and by the ureters to the bladder.

Their bigness.

They are in length about five inches, in breadth three, and in thickness one; yet they are somewhat broader above then under. They are smooth in the gibbous part, unequall in the hollow

low part, to let in and out some vessels.

Their parts.

The parts are two; to wit the externall and the internall; the externall are the membranes; these are two.

Their membranes.

The one is common and externall, borrowed from the *Peritonæum* within the reduplication of which the whole Kidney is lapped; and therefore it is called *Renis fascia*. This membrane is compassed with copious fat; so that the Kidney seemeth to be the fattest of all other intralls, according to *Arist.* 3. *Hist. Animal.* 17. Although each one be exceedingly fat, yet some part of the Kidney will remain uncovered about the middle.

The uses of the fat of the kidneyes.

This fat about the Kidney hath a threefold use. First, it is in stead of a pillow.

Secondly, it receiveth as a spong the excrements.

Thirdly, it furthereth and keepeth in the heat.

Before you deprive the Kidneys

of this *tunica adipoſa* with your nailes, about the upper part of the kidney, you are to obſerve a large glandule, which hath a ſprig from the emulgent vein and artery, for nouriſhment about the middle of it.

Renis ſuc. centuriati

In figure it repreſenteth a halfe moon and is not unlike a kidney; from whence it is called *ren ſuccenturiatus*. There is one on each ſide in the upper part of the kidney, reſting upon the *tunica adipoſa*.

Their figure.

It is ſtrongly tied to the *ſeptum tranſverſum*.

Their connhxion.

The ſubſtance of it is more flaggy then that of the kidney.

It hath nerves from the *plexus retiformis*, or net-like texture, framed of the twigs of the *nervus coſtalis* and *ſtomachicus*.

Their Nerves.

It ſeemeth to be framed, partly to fill up the vacuity which is between the kidneyes and the *diaphragma*; partly to be a pillow to the ſtomack, in the place about the emulgent veine and artery.

Its uſe.

The propermembrane of the kidneys.

The second membrane is that which is internall and proper. This springeth from the common coat of the vessels which enter into the Kidneys: for as soon as the vessels approach to the Kidney, they leave their externall coat. It can hardly be separate from the substance of the Kidney.

Their internall parts.

The internall parts are those which are contained within the proper membrane. In these sundry things are remarkable.

The colour of them.

First, the colour of the Kidney which is very red.

Their substance

Secondly, the substance of the Kidney, which is thick, hard, and compact as the heart almost, but not so fibrous.

The emulgent vessels

Thirdly the description of the emulgent vessels throughout it; first they enter by paires into the hollow part of the Kidney; then each branch is divided iuto four or five lesser branches, and they again into lesser untill at the last they become capillar

These being spred sundry waye

thorow

thorow the ſubſtance of the kidney, towards the gibbous part, at laſt they end at the tops of the *Caruncul æ papillares*, or teat-like fleſhy ſubſtances, into the which they pour the ſeroſity of the blood, that it may paſs thorow the *tubuli*, or water pipes to the *infundibulum*.

The fourth is that which is called *pelvis*, or *infundibulum*, the tunnel, which is nothing elſe but the ample cavity of the ureter within the kidney.

Fifthly, the *tubuli*, or *fiſtul æ ureterum*, the water pipes of the ureters offer themſelves, which are moſt commonly in number ten; foure in each end, two being ſtill joyned together, and two in the middle, according to the number of the *caruncul papillares*. Theſe are placed in the arched part of the *infundibulum*. Now the ends of the pipes about the *infundibulum* are called *cribrum*, or, the ſieve. Theſe water pipes, proceeding from the *infundibulum*, become a little

wider, and end in the gibbous part of the kidney, with a wide round mouth receiving the *caruncul*æ *papillares*, by the which their mouths are ſtopped, and the watriſhneſſe of the blood iſſueth out into them, as milk out of the teats.

Sixthly, *Caruncul*æ *papillares* are to be conſidered. They are ſmall fleſhy bodies, ſomewhat harder than the ſubſtance of the kidney, reſembling the teats of womens paps, from whence they have their denomination; they are of the bigneſſe of a peaſe, ſomewhat broad above, below round. If you divide them through the middle, you ſhall perceive a ſmooth hairlike paſſage from the top to the end.

They are in number anſwerable to the number of the *tubuli*, which receive them.

How theſe parts are to be found out.

To finde out theſe parts before named, you muſt divide the kidney in the hollow part puting a thick probe into the *pelvis*.

Inciſion being made to the *in-*

fundibulum

fundibulum, first you shall see the *tubuli*, then the *Caruncul*æ *papillares*.

The kidneyes have two sorts of veins. Their Veins.

First, the two called *adipos*æ, because they are spred through the *tunica adiposa*, and are covered with the fat, and afford matter for the fat. The right of these springeth from the emulgent veine; but the left from the *vena cava*.

Secondly, the two *emulgentes*, so called from their action. These are large and spring from the trunck of the *vena cava*, descending between the first and second *vertebræ* of the loynes. These being carried transversly, are implanted into the hollow part of the kidneyes, being divided into two branches.

The left is somewhat higher, as also the left kidney; but the right is somewhat longer. It hath a valve to hinder the returne of the serosity to the trunck of the *cava*.

How matters gathered in the cavity of the breſt are diſcharged into the Ureters.

Fallopius was of this mind, tha a branch of a vine paſſeth from th the *vena ſine pari* to the left kid ney, by the which quittour an water may be diſcharged by urine But it is more probable, that thes matters are firſt drawne in into the trunk of the *aorta*, by its inconſpicu ous pores, and from thence ſen to the kidneyes by the emulgent arte ries

The Arteries.

Theſe are in number two, one i each ſide which accompany the vein to the kidney ſlope-wayes. Whithe when they are come, they are divi ded in two branches, whereof th one is implanted in the lower, th other in the upper part of the hol low part of the kidney.

The nerves.

The nerves on each ſide ſpring either from *ramus ſtomachicus*, and that is but one and ſmall, and i ſpread thorow the proper coat; from hence ariſeth the conſent betweene the kidneyes and the ſtomack. So that vomiting is troubleſome in ne phriticall diſeaſes.

Ont

One may think that nature hath afforded arteries larger than was requiſite to afford life to ſo ſmall bodies as the kidneyes are; but it was fit ſo to be; for the paſſages were to be patent, which were to diſcharge the heart and arteries of ſeroſity.

The artery lyeth between the veine and the ureter; partly to haſten the blood to the Kidney; partly, ſpeedily to diſcharge the watriſhneſſe. The place of the arterie.

The veins and arteries are not joyned with the water-pipes; for if you put a catheter into the ureter, by blowing the veſſel will not ſwell.

CAP. XVIII.
Of the Ureters.

THe Ureters in Latine *Meatus Urinarii*, are called in Greek οὐρητῆρες, either from οὐρεῖν, to piſs, or ὅτι οὖρον τηρέουσι, becauſe they keep the urine.

Their number. Their substance

There is one in each side.

There are white vessels, like to veines, yet they are whiter, thicker and more nervous. They reach from the kidney to the bladder.

Their coats.

They have two coats, the one common from the *peritonæum*; the other proper, from the externall or common coat it hath capillar veins and arteries.

Its fibres.

It hath few oblique fibres, but most straight. It springeth from the bladder, for it cannot be severed from it easily, as from the kidneyes.

How the Ureter differeth from the bladder.

Yet it differeth from the bladder in two things.

First, in that the bladder hath three three coats, but it only two.

Secondly, the bladder hath all sorts of fibres but the ureter hath most straight, few oblique.

They are inserted in the backe and lower part of the bladder, not farre from the muscle sphincter, between the two proper coats of it, about the length of an inch.

This

This insertion is oblique to hinder the regurgitation of the urine, when the bladder is either compressed or distended with urine. Although the ureter doth not ordinarily exceed in compasse a barley corne, yet when stones doe passe, it becommeth sometimes as large as a gut

Why the insertion is oblique.

CHAP. XIX

Of the bladder.

THe bladder is seated in the *hypogastrium*, in the place called *pelvis*.

Its place.

Of substance it is membranous, because it was to admit large stretching.

Its substance.

The membranes of it are three. The first is from the *peritonæum*; for it is lapped within the reduplication of it.

Its membranes.

The second is thicker, and endued with many straight fibres, which *Aquapendens* will have to be

be a muſcle ſerving for the compreſſion of the bladder, as the ſphincter ſerveth for conſtriction.

The third and innermoſt is white and bright, of exquiſite ſenſe, as they can witneſſe who are troubled with the ſtone.

Its fibres

It hath all ſorts of fibres.

Its cruſt.

Within it is covered with a mucous cruſt, an excrement of the third concoction of the bladder. This doth mitigate the acrimony of the Urine.

Its perforation.

It is perforate in three parts, to wit, in the ſides, where the ureters are to let in the urine, and before to let out the urine.

Its parts.

The bladder hath two parts, to wit, the bottome and the neck.

Its figure

Both theſe in figure repreſent a peare.

How it is upholden.

The bottome is upholden by the navell: Firſt, in the middle by the ligament called *urachus*, which is the cauſe ſometimes, that they who have a great ſtone in the bladder, complain of great paine about the navell.

Se-

Secondly by the umbilicall arteries dryed laterally.

If the bladder were not ſuſpended, a man going ſtraight up, the bottome of the bladder would compreſſe the neck, and cauſe difficulty in making water.

Why mans bladder is ſuſpended.

In man it lyeth between the *os pubis* and the *inteſtinum rectum*. In women between the neck of the matrix and *os pubis*.

Its ſeat in Man and woman.

The bladder of man differeth from the bladder of beaſts in two things. Firſt the bladder of man is couched within the reduplication of the *peritonæum*, but in beaſts it is looſe, and onely is tied to the *inteſtinum rectum*.

How the bladder of Man differeth from the bladder of beaſts.

Secondly, the bladder of man hath fat without, but the bladder of beaſts none.

In it ſtones are promptly engendered, becauſe the heat of it is compact: ſo red hot iron burneth worſe than the flame of fire.

Why ſtones are ingendred in it.

There is a great conſent between the bladder and kidneyes. So that in diſeaſes of the kidneyes, difficulty

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Why there is a conſent between the bladder and kidneyes.

culty in making water ſometimes happeneth. The cauſes of this conſent are two.

First, the communion of office; for both ſerve for the excretion of urine.

Secondly the ſimilitude of ſubſtance; for both the inſide of the the kidneyes & the bladder are membranous.

An Obſervation

One thing is to be noted, that a bladder is beſtowed onely upon ſuch creatures as have bloody lungs, and the hotter the lungs are, the biger the bladder is.

Why the bladder in man is big.

So man according to his ſtature, hath of all living creatures the biggeſt bladder; according to *Ariſt. lib.* 1. *Hiſtor. Animal.* Becauſe the bladder is of a cold temperature, therefore in deadly diſeaſes of it, ſleepineſſe oppreſſeth the Patient according to *Hippocrates*, 6. *Epidem.*

The muſcle ſphincter

In the necke onely the muſcle *ſphincter* doth offer it ſelf to be conſidered, whereof read in the doctrine of muſcles.

In

It hath veines and arteries called *Hipogaſtricæ*, implanted on every ſide of the neck, which are immediately divided into two branches; whereof the one is beſtowed upon the bottome, the other upon the neck. Its veſſes

It hath remarkable nerves; partly from thoſe of the ſixth conjugation, which paſſe by the roots of the ribs, partly from thoſe which ſpring laſt from the *os ſacrum*. Its nervs.

The uſe of the bladder is to containe the urine, like a chamber-pot, untill the time of excretion come, when the bladder is full. Its uſe.

CAP. XX.

Of the generation of blood.

FIrſt of all, every nouriſhment receiveth a preparation in the mouth. If it be ſolid, it is chewed by the teeth, from the mouth by ſwallowing it is turned to the ſtomack.

How the *Chylus* is made.

mack. It being embraced by the ſtomack and kept for a while is turned into *chylus*, partly by the ſpecificall heat of the ſtomack it ſelfe; partly by the heat of the adjacent parts; but chiefly of the liver, ſpleen, and caul.

The *chylus* being made light by concoction, it riſeth up and paſſeth to the *pylorus*, and procureth the opening of it. This being opened, the ſtomack by its tranſverſe fibres, thruſteth the *chylus* into the *duodenum*, From hence it paſſeth more and more downewards by degrees. The wrinkles of the ſmall guts hinder the ſudden paſſage of it to procure an equall concoction of all the parts of it.

In the mean time the *venæ lacteæ* draw from the ſmall guts, whatſoever is alimentary of the *chylus*. While the *chylus* thus paſſeth to the liver, and is come to the divarication of the *vena portæ*, the ſpleen by a naturall faculty by the *ramus ſplenicus*, draweth to it ſelf the thickeſt and moſt terreſtriall part, yet

yet the pureſt only may come to the liver.

When the *chylus* is come to the liver, the choler is ſent either by *meatus cyſticus*, to the gall or to the *jejunum*, by *meatus kepaticus*.

The bloud being perfected, the groſſer part is carried by the branches of the *vena portæ*, and the ſplenicall to the nouriſhment of the parts appointed for nutrition; but the pureſt part is carried to all other parts for their nutrition: and becauſe much watriſhneſſe is mingled with the bloud, that it may paſſe without difficulty, by the narrow paſſages of inoſculations, to the *vena cava*, (ſeeing the ſeroſity is unapt to nouriſh) it is ſent by the emulgent veins and arteries to the kidneys, and from thence by the ureters to the bladder.

CHAP.

CHAP. XXI.

Of vaſa præparantia in Man.

Hitherto we have handled the parts appointed for nutrition. Now it followeth to run thorow the parts ordained for generation to continue man-kind.

The differences of the genitals.

The genitals are of two ſorts; of the male and female; and ſo it was requiſite for procreation; for this action requireth an agent and patient: ſeed and menſtruall blood.

The firſt is the place of the plaſmatick ſpirit. The ſecond affordeth ſupply of matter to the ſpirit, to draw out the admirable frame of the regions and parts of the little world.

The parts of the genitals in man.

In man ſome of theſe parts afford matter for the ſeed, to wit, the foure *vaſa præparantia*: ſome elaborate this matter, as the *corpus varicoſum*: ſome make the ſeed fruitfull, as the ſtones; ſome carry the ſeed

ſeed back again, and make it pure as thoſe which are called *vaſa deferentia*: ſome contain the ſeed and an oleaginous matter, as the *veſiculæ ſeminales*, and the *proſtates*; ſome diſcharge the ſeed into the matrix: this is done by the *penis*.

Vaſa preparantia, which prepare matter for the ſeed, are of two ſorts, veines and arteries. *vaſa præparantia.*

The veines are two. The right ſpringeth from the trunck of the *vena cava*, a little under the emulgent.

The left proceedeth from the emulgent.

The arteries ſpring from the trunck of the *aorta*, theſe veſſels being a little diſtant one from another, are tyed together by a thin membrane, which ſpringeth from the *peritonæum*, and met often by the way by inoſculation. Theſe veſſels are greater in men than in women, and the arteries are bigger than the veines, becauſe much heat and plenty of ſpirits are required for The Arteries.

for the ſeed. They enter into the groyne obliquely, carryed together with the muſcle cremaſter, between the two coats of the *peritonæum*.

In curing of a rupture by inciſion, if the muſcle cremaſter doe fall out to be bound by the ligature, *Spaſmus cynicus* enſueth.

The ending of the veſſels.

Theſe veſſels do end about the beginning of the teſticles, and from hence are called ἐπιδίδυμοι, and make up that part which is called *corpus varicoſum*, *paraſtata*, & *plexus pampiniformis*. From the ſtones to it many ſmall fibres paſſe.

Corpus varicoſum

The *corpus varicoſum* is framed of the twiſting of the *vaſa præparantia*; which maketh a long thick, *glandulous*, but hard welt, without any remarkable cavity, which paſſeth to the bottom of the ſtone, and from thence to the *vas differens*, where it endeth.

Here the venall and arteriall blood being elaborate in theſe admirable windings, is further prepared

pared, a quality being imparted from the ſeminificall faculty of the ſtones.

CHAP. XXII.

Of the ſtones.

THe ſtones in Latine are called *Teſtes*, becauſe they teſtifie one to be a man.

They are glandulous bodies, flaggy, ſoft, and white, without any cavity, full of ſmall veins and arteries, ſuch as are not in any part of the body. Their ſubſtance

They are in number two, and therefore in Greek are called ὄρχεις. Their number.

Their figure is ovall, the right is hotter, and better concocteth the ſeed: Wherefore by *Hippocrat.* it is called ἀρρενογόνον, a begetter of the male. Their figure.

The left ſtone is more full, and hath a bigger veine; yet the ſeed which is there elaborate, is more watriſh

watriſh, and colder, becauſe it proceedeth from the emulgent, and is called of *Hippoc.* θηλύγονος, becauſe it begetteth the female. In the ſtones there are to be conſidered their coats, ſubſtance, and uſe.

Their coats.

Their coats are foure.

Firſt, *burſa ſcroti*, and it is nothing elſe but the skin covered with the *cuticula*: And becauſe it cleaveth firmly to the *Membrana carnoſa* under it, ſo that they ſeeme to make but one coat, it commeth to paſſe that in cold it doth contract it ſelf, and becommeth wrinkled.

The line

In the lower part it hath a line, according to the length, whereby it is divided into the right and left ſide; this line is called *futura*, or a ſeame.

Secondly, it is called by *Rufus*, *dartos*: becauſe it may eaſily be ſtead from the *tunica vaginalis*: by the Ancients it was called *erithroides*, becauſe it appeareth to be red, by reaſon of the fleſhy fibres, where

wherewith it is enterlaced.

This ariſeth from the *membrana carnoſa*; which here is more thin and ſubtile than elſe-where, and ſtored with veins and arteries.

The third is *elythroides*, or *vaginalis*; becauſe it contains the ſtone as a ſheath. It is a thick and ſtrong membrane, having many veins. In the outſide it is uneven, by reaſon of the fibres by the which it is tied to the *dartos*; but in the inner ſide it is ſmooth. This is nothing elſe but the production of the *peritonæum*.

The fourth is ὑμὴν νευρώδης the nervous membrane called, *albuginea*, from its colour, It is white, thick, and ſtrong, framed of the externall tunicle of the *vaſa præparantia*. It is immediately wrapped in the ſtone; between theſe two the water is contained in *Hernia aquoſa*.

The ſubſtance is deſcribed in the beginning of the Chapter. Each ſtone hath one muſcle called *cremaſter*, from κρεμάω, or κρεμάζω, which

is to hold up; becauſe it pull:th up the ſtone in the act of generation, that the veſſels, being ſlacked, may the more readily voyd the ſeed.

This muſcle is nothing elſe but the lower part of the oblique muſcle, aſcending neere to *os pubis*, which outwardly wrapping the production of the *peritonæum*, is carried to the ſtone.

Theſe muſcles in ſickneſſe and old age become flaggy, and ſo the *ſcrotum* relaxeth it ſelf, and the ſtones hang low.

The uſes of the ſtones are three:

The firſt is to elaborate the ſeed by reaſon of the ſeminificall faculty reſident in the *parenchyma* of the ſtones; for they turne the blood, which is brought by the *vaſa præparantia*, into ſeed, for the moſt part; the reſt they reſerve for their own nutrition.

The ſecond is, they add heat, ſtrength and courage, to the body, as gelding doth manifeſt, by the which all theſe are empaired.

Thirdly,

Thirdly, they receive the ſuperfluous humidity of the ſeed, by reaſon of their glandulous ſubſtance.

CAP. XXIII.

Of the Veſſels that carry the ſeed, and thoſe that keep it.

Vaſa differentia, the Veſſels which carry the ſeed; in choler they are white; in ſubſtance ſinewy, having an obſcure hollowneſſe; from hence they are called *Meatus ſeminales*. They ſpring from the lower end of the *paraſtatæ*. Theſe mount up by the ſides of the *Vaſa præparantia*.

When they are come within the cavity of the belly, they turne back again and paſſe to the backſide of the bladder; betweene which, and the *inteſtinum rectum* the paſſe, untill about the neck of the bladder, being ſomewhat ſevered, and at laſt being joyned together, but not united, are inſerted on

on each side in the glandulous bodie called *prostatæ*.

Vesiculæ seminalis.

Before they come thither they are joyned to the *Vesiculæ seminalis*. These in figure represent the cels of a Pomegranate, or honeycomb.

Their substance

These contain an oily and yellow substance, for they draw unto themselves that which is fatty in the seed.

They are more in number, that the oleous substance should not forcibly and plentifully be poured into the *urethra*, but should gently and slowly passe from one unto another by windings, and at last be poured into the conduit of the yard by a hole which is shut up with a fleshie substance, partly to stay the involuntary effusion of it, partly to hinder the regurgitation of it. It being poured into the *urethra* chiefly in the time of carnall copulation, doth moisten it that it shrink not, and suffereth it not to be offended by the acrimony of the seed or urine. The

Vasa

Vaſa deferentia paſſing by theſe, goe to the glandules, called *proſtatæ*, by the which they are compaſſed.

When they are come to the *urethra*, a caruncle as a valve is ſet before the orifice of each of them; partly to hinder the comming of the urine into them, partly to hinder the involuntary effuſion of the ſeed.

The uſe of the caruncle in the Urethra.

Under and by this caruncle on each ſide there are three holes, thorow which the ſeed paſſeth into the urethra. Theſe holes are diſcerned eaſily in a gonorrhea inveterate, although not ſo eaſily in a ſound perſon.

The holes by which the ſeed paſſeth to the Urethra.

The ſeed doth paſſe thorow theſe inconſpicuous paſſages, as quick ſilver thorow lether, by drops. The ſeed having been made ſubtile and ſpirituous by ſublimation thorow the *Vaſa deferentia* aſcending, is able to paſſe thorow inconſpicuous paſſages.

Proſtatæ, or *glandulæ ſeminales*, are glandulous bodies, placed between

tween the neck of the bladder, and the *intestinum rectum*. Although there is no conspicuous passage by the which the seed passeth into the urethra; yet the thick membrane which wrappeth in the prostate, where it leaneth upon the urethra, is thinner, and hath many pores, which are dilated by heat in the act of generation, and may be seen in an inveterate *gonorrhea*.

A continuall dilatation of these procures an uncurable *gonorrhea*.

The sphincter of the bladder compasseth these glandules. In drawing of a stone, if these parts be torne, the party becommeth barren.

Perinæum.

The distance betwixt the root of the *cod* and the *podex* is called *perinæum*, because it is still moist with sweat. The *pubes*, *scroton*, & *perinæum* in men, are furnished with haire, because glandules are placed there, which receive plenty of superfluous moisture: a part whereof

Why these parts in men are hairy.

whereof they ſend to the skin for the generation of hair. If the ſeed chance to be corrupted in man, it cauſeth not ſo fearful ſymptomes as in a woman, becauſe the ſeminary veſſels are without the *hypogaſtrium* in man, but in women within.

Why corrupt ſeed is worſe in woman than in man.

CAP. XXIV.

Of the Yard.

IT called in Latine *Penis*, *à pendendo*, becauſe it hangeth without the belly; and it is an organicall part, long and round, yet ſomewhat flat in the upper part, ſeated about the lower part of *os pubis*, appointed for making of water, and conveying the ſeed into the matrix.

The deſcription of it.

It is framed of ſuch a ſubſtance as might admit diſtention and relaxation.

The parts of it are either common or proper.

Its parts

Why it hath no fat.

The common are three, the ſcarf skin, the skin, and the *membrana carnoſa*.

It hath no fat, for it would have hindered the ſtiffneſſe of it.

The *cuticula* and *cutis*.

The *Cuticula* is of a reaſonable thickneſs: the skin is ſomewhat thick, flaggy, when there is no erection, but ſtiff when there is.

The *membrana carnoſa*.

The *membrana carnoſa* is ſomewhat fineewy.

The internall parts.

The proper or internall parts are theſe: the two nervous bodies, the *ſeptum*, the *urethra*, the glans, four muſcles and the veſſels.

The two bodies.

The two bodies are long, hard, and nervous. Theſe within are ſpongious and full of black blood. The ſpongious ſubſtance ſeemeth to be a net-like texture, framed of innumerable twigs and veines and arteries.

This black blood contained in theſe laterall Ligaments, being full of ſpirits waxen hot by the ſting of *Veuus*, doth diſtend the parts.

Theſe

These two laterall ligaments, where they are thick and round, spring from the lower part of the Share-bone. In their beginnings they are separate one from another, and represent the two hornes of *Pythagoras* his Y, that the *Urethra* may passe between them. Their beginning.

But as soon as they come to the joyning of the share-bone, they are by the *septum lucidum* everted. It is nervous and white. *Septum lucidum.*

It ariseth from the upper part of the commissure of the *os pubis*, and upholdeth the two laterall ligaments and the urethra, as a stay. The like is found in women to uphold the *cunnus*. Under these lieth the urethra.

It is of a substance nervous, thick, loose, and soft, like to that of the laterall ligaments, it beginneth at the neck of the bladder, yet it doth not spring from it, but is joyned to it only, and so passeth to the glans. If you boile the bladder and it, it will separate it self from the bladder. The *urethra.*

Its frame

It is framed of two membranes, the one is internall, with the which the glans is covered; it is bred of the thin membrane which covereth the nerves of the prick. It is of an exquisite feeling, that it might feel the acrimony of the seed, and cause pleasure, chiefly in that part of it which lieth between the prostates.

The externall is fleshie, and hath many fleshie transverse fibres. The middle substance is fungous, and full of black blood, that it might suffer distention and relaxation with the latter ligaments.

At the beginning of it there are three holes, one in the middle largest, and two lesser, in each side one, from the passage which is sent from *vesiculæ seminales* to the urethra.

Its muscles.

The muscles are two in each side, and so four in all. Of these collaterall muscles, the one is shorter and thicker, and springeth from the *appendix*, or knob of the *coxendix*, under the beginning of the laterall

laterall ligament, and aſcending obliquely, is inſerted into the ſame, a little below the beginning of it; this ſerveth for erection.

The ſecond is longer and ſmaller, proceeding from the ſphincter of the *anus* fleſhy.

This paſſeth ſtraight under the urethra, and is inſerted about the middle of it, in the ſide of the prick. Theſe two muſcles dilate the lower part of the urethra for miction and ejaculation of the ſeed, As the firſt muſcle is termed *erector*, ſo this is called *accelerator*, or haſtner.

This hath a ſubſtance agreeable with that of the *penis*; for this in erection is drawn towards its beginning, and the erection ceaſing, it becommeth lank.

Glans is the extreame part; it is ſomewhat round, compaſſed with a circle, as with a Garland. It is ſoft, and of an exquiſite feeling, by reaſon of the thin skin, with the which it is covered. About the

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root of it: where it is joyned with the nervous bodies there is a little pit: In the which if any ſharp humour be lodged, as in *gonorrhœa virulenta*, great paine is cauſed.

Præputium. The Glans is covered with *præputium*, the fore skin; it is framed of the reduplication of the skin.

Frænum. The ligament by the which it is tyed to the glans in the lower part of it, is called *frænum*, the bridle.

The veſſels. Of the veſſels, ſome are cutaneous, ſome paſſe to the inner parts of *penis*.

The *Cutaneous* veines and arteries ſpring from the *pudenda*; theſe entering at the root of the prick, they paſſe by the ſides towards the back of it, and are conſpicuous enough. The veſſels which beſtowed upon the inner parts of *penis*, come from the *Vena* and *arteriæ hypogaſtricæ*, about the roots of the laterall ligaments. Here the arteries are remarkable, which are wonderfully diſperſed through the body of the *penis*: for the right artery

artery is bestowed upon the left side and the left side upon the right side.

It hath two sinewes from the *Os sacrum*. The lesser is bestowed upon the skin; the largest mounting up under the share bones to the root of the yard between the laterall ligaments; it is bestowed upon the muscles the rest of the body of the *Penis* and the Glans. Its sinews.

Of the GENITALS in Women.

CAP. XXV.

Of the Cunnus.

THe Genitals in a Woman have four distinct parts; to wit, the *Cunnus*, the Matrix, the stones, and the spermatick vessels.

Cunnus is that part which offereth it self to the sight before section. In it eleven particles are remarkable. The particles of the *Cunnus*.

1. *Pubes*, that particle where

the hair doth first bud out; which ordinarily falleth out the fourteenth yeer of a womans age; the upper part of this which buncheth out, and is most hairy, is called *Veneris mons.*

2 Is *Rima magna*, the great chink; it beginneth at the *os pubis*, and is but an inch distant from the *anus.* Wherefore it is larger then the cavity of neck.

3 The *Labia* or lips; by these the internall parts are covered, as the tongue and teeth by the lips. These are framed of the common integuments of the body, these have pretty store of spongeous fat.

4 Are the *Alæ*, or *Nymphæ*, the wings; these appear when the lips are severed: These are two productions framed of a soft and spongious flesh, and the reduplication of the *Cutis*, placed at the side of the neck: Being joyned above, they compasse the *Clitoris.* In figure and colour they resemble the comb of a Cock.

5. Is *Clytoris*, this is a nervous and

and hard body: within, full of a black and ſpungious matter, as the lateral ligaments of the yard. It is framed of three bodies. The two laterall are ligaments, and ſpring from the internall knob of the *Iſchium*. The third is betwen theſe; this ariſeth from the joyning of the *os pubis*; at the end of it is the glans, which hath a ſuperficiall hollowneſs, and is covered with a very thin skin, as a *Præputium*, which ſpringeth from the joyning of the *Nymphæ*. And as it doth repreſent the prick of a man, ſo it ſuffereth erection, and falling; it may be called a womans prick. In ſome women it hath been as big as a mans.

6 Under the *Clytoris* above the neck, a hole is to be ſeen, by the which a woman maketh water.

7 After the *Nymphæ* four caruncules, reſembling the leaſe of the mirtle ſhrub, are to be ſeen: Whereof that which is uppermoſt, is largeſt and forked, that it might receive the end of the neck of the bladder

bladder, the other is below: The other are on the ſides. All foure keepe back the ayre, and all other things, from entering into the cavity of the neck, and by tickling the genital of man cauſe the greater delight. In women which have not borne children, they are moſt conſpicuous.

Theſe caruncles are framed of the reduplication of the fleſhy neck of the genital.

8 Behind the caruncles appeareth a cavity in the lower part of the neck of reaſonable largeneſſe, framed by nature to ſtay the ſeed poured into the neck from too quick ſlipping out.

9 In Virgins theſe caruncles are joyned together by a thin and ſinewy membrane interlaced with ſmall veines, cleaving orbicularly to the ſides of the neck, having a ſmall hollowneſſe in the middle, which will receive a peaſe, by the which the menſtruall blood paſſeth: Some times it is hollow like a ſiev, it is called *hymen*.

10 Be-

10 Behind theſe caruncles and the *hymen* appeareth a chinck, under the orifice of the bladder betweene the two wings, which is enterance into the neck.

11 Now the neck is nothing elſe but that diſtance, which is betweene the *Cunnus*, and the mouth of the matrix. The neck.

In women of an ordinary ſtature, it is eighth inches in length. Its length.

The ſubſtance of this part is hard, without fleſhy, within membranous and wrinckled, like to the inner skin of the upper jaw of a cowes mouth. Its ſubſtance.

Firſt, to cauſe greater pleaſure in the act of generation.

Secondly, the better to retaine the ſeed.

Thirdly, to admit the greater dilation in travell.

The neck is ſeated in that cavity of *hypogaſtrium*, which is called *pelvis*, betweene the bladder and *inteſtinum rectum*. It hath two membranes; if you cut them tranſverſly, you ſhall perceive betweene Its ſeat.

them

them a ſpongious fleſh: ſuch as is found in the lateral ligaments of the *Penis*. This cauſeth it to ſwell in the act of generation, innumerable ſprigs of veins and arteries affording plenty of ſpirits.

It veſſels.

The hypogaſtricall veines are inſerted into the neck of the Matrix: from thence paſſing to the mouth of the Matrix. As ſoon as they come to be implanted into the ſubſtance of the *uterus*, they loſe their own coats which are beſtowed upon the firſt membrane of it. From thence by ſmall pipes (ſuch as are found in ſponges, but wreathed) blood is carried to the Matrix: by theſe veines the termes iſſue into the neck of the genital.

A large branch paſſeth from *arteria hypogaſtrica*, to the neck. A ſprig of it, but wreathed as communicate to the teſticle, paſſing thither between the two membranes of the body of the Matrix: This ſprig is winded to hinder it from ruption, when the Matrix is enlarged,

enlarged, a woman being with child.

CHAP. XXVI.

Of the Matrix.

THe matrix was appointed by Nature to be the field of Nature, to receive the ſeeds of man and woman, for the procreation of man, and the continuation of mankinde.

The parts of it.

It hath two parts, *os uteri*, the mouth of the Matrix, and *fundus* the bottom.

The mouth of it.

The mouth is a hole at the entrance of it, which like a mouth may be dilated, or purſed in: this entrance is but a tranſverſe line, which when it is exactly opened becommeth round.

This oriſice, although in the act of generation it may be ſo dilated, that it will receive the glans of a mans genitall; yet after conception it is ſo cloſely ſhut, that it will not admit the point of a bodkin; when a woman is delivered it ſo openeth

openeth it ſelf that it maketh way for the infant be it never ſo big. In thoſe who have been mothers, it is like to the mouth of a whelpe. The cancer of the matrix moſt commonly beginneth here, becauſe it is ſomewhat fleſhie: within this orifice a long knobby ſubſtance is placed, to helpe the ſhutting of the orifice the more exquiſitely. About this knobby ſubſtance ſmall wholes are to be ſeen, which ſeem to be the ends of the ejaculatory veſſels.

Its figure

In figure it is like a peare or a cupping glaſſe.

Its bigneſſe.

In virgins even of big ſtature it exceedeth not the bigneſſe of a walnut; But in thoſe who are with childe, it doth dilate it ſelfe into that capacity, as is able to containe the childe.

Why it is ſmall.

It was to be ſmall, becauſe the ſeed in quantity is but little, which it ought to embrace and cheriſh.

No diſtinct cels in it.

It hath no diſtinct cels, as the matrix of a beaſt hath; only a line, as in the tongue and cod, doth ſeparate the right ſide from the left. In length

length from the orifice to the extremity of the bottome, it is thought to be three inches.

The internall ſuperficies is rough, the better to keep the ſeed. Its frame

The matrix is framed of two membranes; the externall ſpringeth from the *Peritonæum*, and is the thickeſt of all other that ſpring from it. It is ſmooth and ſlippery, if you except thoſe parts where the ſpermatick veſſels enter into matrix, and the ligaments goe out. The internall membrane is full of ſmall holes, where the matrix covereth the *inteſtinum rectum*.

When the courſes flow, they are eaſily ſeen; but not when they ceaſe. The Ancients did take theſe to be the mouthes of the veines and arteries.

And becauſe they reſemble in figure the meaſure appointed for the ſelling of vinegar, they called them *Acetabulæ* or *Cotyledones*. By theſe holes the menſtruall blood iſſueth. *Acetabula.*

Above at the ſides of the externall membrane two little bunches, ſuch *Cornua uteri.*

such as are seen in Stirks or Heifers, when the hornes begin to bud are to be marked. They are called *cornua uteri.*

Its vessels.

For nourishment it hath both veins and arteries.

The Veins.

Of these the veins are bigger than the arteries: the veins spring from two branches on each side: one branch commeth from the *vasa præparantia:* this doth descend, and is spread thorow the whole matrix: but chiefly thorow the bottome: and seeing the sprigs are implanted in each side, the right are coupled with the left by inosculation.

The other branch, which commeth from *ramus hypogastricus*, doth ascend from the lower parts, and is sent partly to the orifice, partly to the bottome. These are larger than those which spring from the *vas præparans.* Both these being dispersed thorow the substance of the matrix, are united by inosculation also.

Some will have the menstrual blood

blood to flow from the twigs sent from *Ramus hypogastricus* when a woman is with child: being perswaded by the *Aphorisme* of *Hippocrates lib.* 5. *Aphor.* 51. that nothing can flow from the cavity, the to orifice being so shut that it cannot admit the point of a bodkin; but the word συμμέμυκεν signifieth onely *connivens*, or shut together, as the eye lids are. And although in the first moneths the orifice be exactly closed; yet then a woman is great with child, the orifice gapeth a little and is shut with a mucous seminall substance, which doth repell the aire and the lubricate the orifice in the delivery.

Its arteries.

It hath arteries also, which spriug from the preparing arteries, and from the *hypogastricæ*, as the veines did; these accompany the veines, and are distributed as they are.

The finews.

The finews first do spring from the fixth conjugation: they are small and are bestowed upon the bottome:

bottome than from the parts which ſpring from the *os ſacrum*.

Theſe are beſtowed partly upon the lower part of it, and partly upon the *Cunnus*. Theſe are larger, becauſe in the acts of generation great delectation is required.

By theſe veſſels, arteries, veines, and nerves, the matrix hath a conſent with all the reſt of the body. And although the veines and arteries ſeeme to be ſmall in women which are not with childe yet in thoſe who are with child, by the affluxion of blood they will, ſometimes become as thick as a finger. Yea in ſuch the matrix, which otherwayes is membranous, as hath beene ſaid, becommeth in the laſt moneths thicker and ſofter; ſo that about the upper part of the bottome; unto the which the *placenta uteri* is tyed, it becommeth almoſt two inches thick.

The matrix is onely tyed to the adjacent parts laterally: for above, fore, and after, it is free, that it might

migh admit dilatation, and deſcend or aſcend in the act of generation.

Its ligaments.

Now the ligaments are in number four: The two uppermoſt, broad and membranous, are nothing elſe but productions of the *peritonæum*, which tye the matrix to the *oſſa ilii*.

They are looſe and ſoft, that they might admit dilatation with the matrix, when a woman is with child, and conſtriction, when ſhe is not.

Theſe carry the *vaſa præparantia* and *deferentia* to the matrix, and lap up the ſtones: they repreſent the wings of a bat, and ſayles of a ſhip ſpread abroad. Theſe keep the matrix ſteady in its own place, that it neither aſcend nor deſcend.

The two lower ligaments are nervous, round and hollow; they ſpring from the ſides of the bottome of the matrix, neer to the *vaſa deferentia*, which they touch; they goe downe to the groynes, by the production of the *peritonæum*, ſtren

ſtrengthened by the glandules: and being dilated like a membrane, they beſtow one part upon the *clytoris*: the reſidue paſſeth to the knee, in the inſide of the thigh by the *membra adipoſa*: this is the cauſe why women after conception feel paine in the inſide of the thigh.

Theſe ligaments ſerve not onely to ſave the matrix, but becauſe they are hollow, by them noyſome humors of the genitales are ſent to the glandules of the groynes. So after impure copulation, the ſeminary veſſels being infected, the contagious humour, by theſe ligaments is ſent tothe groynes; from whence ariſe *bubones venerei*.

Cap. XXVII.

Of the ſtones and the ſeminary veſſels.

WOmen have ſtones as men have; but they differ

fer in eleven things.

The differences between the ſtones of a woman and of a man.

1. In ſituation; for they are placed not without the *hypogaſtrium*, as in men; but within it: that they might bee the hotter and more fruitfull.

2. In quantitie; for they are leſſer.

3. In their frame; for they are compoſed of five or ſixe bladders, which make them uneven; whereas the ſtones of men are ſmooth: theſe bladders containe an humidity like to whey; but it is thicker.

4. The ſtones of women have no *cremaſters*; but are ſtayed by the broad laterall ligaments, called the bats wings.

5. They have no *proſtates*.

6. They differ in figure; for in man they are ovall, but in women flattiſh.

7. They have but one membrane; whereas men have foure.

8. In ſubſtance; for they are more ſoft and flaggie than in men.

9 In

9 In temperature; for they are more cold than mans ſtones, and containe a thin wateriſh ſeed.

10 In women they are tyed to the ſides of the *uterus*, by the two upper ligaments, which are looſe and membranous.

11 In women which are not with child, they are placed above the matrix, two inches diſtant from it.

Its veins. The ſeminary veſſels preparing are foure; two veins, and ſo many arteries.

The veine of the right ſide ſpringeth as in man from the trunck of the *vena cava* under the emulgent; but that of the left ſide ſpringeth from the middle of the emulgent of the ſame ſide.

Its arteries. Both the arteries ſpring from the deſcending trunck of the great artery. Theſe veins are not united as in man, before they come to the ſtones, but are divided into two branches. Whereof the greater being ſtayed by the membranous ligament

gament, is carried to the ſtone; but the leſſer endeth in the bottome of the matrix in the upper part, for the nutrition of the matrix, and the *embryo*.

These *vaſa præparantia* differ from thoſe in men in theſe things. The difference between theſe and thoſe in men.

Firſt, they are ſhorter than in men, by reaſon of the ſhortneſſe of the paſſage; but they have more wreathings where they make *corpus varicoſum*, about the ſtone, that the ſeed may be the better prepared.

Secondly, they paſſe not whole to the ſtones as in men; but are divided in the midway, as hath been ſaid.

One thing is to be noted, that the ſpermatick veins receive the arteries as they paſſe by the ſides of the *uterus*, that the blood might be the better elaborate; for if you blow up the *vena ſpermatica*, both the right and left veſſels of the matrix are blowne up. From hence you may perceive the communion of all the veſſels of the matrix. An obſervation

Vasa diferentia.

The *Vasa deferentia* spring from the lower part of the stones. They are firm, white, and nervous. They pass by the membranous ligament to the matrix, not streight, but wreathed; that the shortnesse of the way might be recompensed with the multitude of windings. Neer the stones they are somewhat broad: When they have marched a little, they become narrow, and about the matrix they become broad again, and end in the *cornua* and capacity of it.

Tuba Fallopiana.

Amongst these vessels, the last to be considered is *Tuba Fallopiana*. *Spigelius* calleth it *Vas cæcum*, *lib.* 8. *cap.* 20. because it hath but one orifice, as the *intestinum cæcum* annexed to the *colon*; this springeth from the *cornua* or bunches, and resembleth the end of a trumpet, and passeth obliquely, over against the stone carried by the membranous ligament, and compasseth the stones: but it neither proceedeth from the stones, neither is inserted into them: And as in its beginning it

it is open; ſo in its ending it is ſhut.

Riolan will have it to be the end of the ejaculatory veſſel, ending within the matrix. He obſerveth, that within it is to be ſeen a long, white and ſinewy body, which he will have to be the continuation of the ejaculatory veſſel. He noteth alſo that a ſmall ſprig doth paſs, but wreathed, from the ejaculatory, by the ſides of the *uterus*, to the orifice, by the which women with child ſpend their ſeed in the act of generation: which *Spigelius* denied in the cited place, and checketh *Laurentius* for affirming ſuch a paſſage.

THE SECOND

BOOKE,

OF THE

BREST.

CHAP. I.

Of the common containing parts of it.

HItherto then of the lower belly, the ſeat of the naturall ſpirit, and of the parts appointed for nutrition and procreation: Now it followeth that we handle the middle cavity, the ſeat of the vitall ſpirits, which containeth thoſe parts appointed for the cheriſhing of the naturall heat and diſtribution of the ſame to

to all other parts of the body, and the cooling of it, if it exceed the naturall degree.

This ventricle is seated in the middle, between the uppermost, which is the head, and the lowermost which is the belly: for it was fit, that it should be so, that the heat passing thorow all and bestowing life, should equally be bestowed upon all the parts of the body. Its situation.

It is severed from the head by the neck; from the belly by the midriffe. It is bounded in the forepart by the breast-bone and cartilages. In the sides by the ribs: behind by the *vertebræ* of the back. Its limitation.

The figure of it is oval, somewhat flat before and behind, whereas in beasts it is somewhat sharp: So that onely man lieth on his back. Its figure

It is partly bony, partly fleshy, that it might admit motion, and yet not stifle the heart; the fleshie parts being suspended by the bony. Its substance.

Its parts.

The forepart of it is called *ſternum*, the ſides *coſtæ*, and the hinder part *dorſum*. The parts whereof it is compoſed, are either containing, or contained. The parts containing are either common or proper.

The common containing parts

The parts containing common are in number four, *Cuticula*, *Cutis*, *pinguedo*, and *membrana carnoſa*.

1,2 *Cuticula.*

The ſcarfe skin, and skin of it do ſuffer from thoſe in the belly: for it is hairy under the arm-pits, and above the pit of the heart: the skin of the back is both harder and thicker, and ſo is leſſe hairy.

Secondly, the skin of the back-parts is of an exquiſite feeling: firſt, becauſe many twigs of ſinews are beſtowed upon it from the *Nervis*, proceeding from the *ſpinalis medulla*: ſecondly, by reaſon of the muſcles of the breſt placed there, which have many tendons, and ſo are very ſenſible.

3. *Pinguedo*

As for the fat, it is not plentiful here, as in the belly: firſt becauſe

cauſe the naturall heat here is ſufficiently preſerved without it: ſecondly, becauſe it would have hindered the motion of the breſt. Onely here it is ſomewhat yellowiſh.

The *membrana carnoſa* here in the fore-part of the neck is more fl ſhy than in other parts, chiefly where the *muſculus quadratus* is framed, which pulleth downe the cheeks and lips. 4. The *Membrana carnoſa*

CHAP. II.

Of the Dugs.

THE proper containing parts are either externall or internall. The externall are in number three, the dugs, the muſcles, the bones. The internall proper containing parts are three in like manner; the *pleura*, the *mediaſtinum*, and the *pericardium*. The parts of the breſt

Dugs are granted to both the ſexes; in men they are framed of the *cutis*, the *membrana carnoſa*, The paps of men.

fat, and the nipple, and ſerve onely for beauty, and are called *mammillæ*

If in man a whitiſh ſubſtance repreſenting milk, be found in the nipples, which hath beene ſeene, as witneſſeth *Ariſtot.* 1. *Hiſtor. Animal.* 12. it is unprofitable, and unapt to nouriſh.

The paps in women beſides theſe parts, have remarkable veſſels, glandules and pipes, to containe the milke perfected by the glandules.

The parts of the paps in women.

The glandulous bodies.

The glandules are many, not one; that the milke might be the better elaborated, there is placed above the reſt one ſomewhat bigger under the nipple. Between theſe are placed innumerable veins and arteries, which receive blood from the matrix the materiall cauſe of milk.

When theſe are full of blood, the milk is made by the property of the ſubſtance of the glandulous bodies, and their temperament. The milk perfected is ſent to the

tubuli

tubuli lactiferi, or conduits of milk, these end in the nipple.

The veines are of two sorts, for some are externall, some internall. The externall spring from the axillar branch, and are placed under the skin which covereth the dugs, to nourish it, and are called *Thoracicæ superiores*, or the uppermost brest veines. The internall or inferiour called *mammariæ*, spring from the *rami subclavii*: They are in number two, whereof one doth march downward straight by the sides of the brest bone. When they are come to the *mucronata cartilago*, they passe out of the brest and go downward by the lower part of the *musculi recti*. When they are come to the umbilicall region almost they are joyned with skin by sundry inosculations, with the *venæ epigastricæ*, which meet them there.

The veines.

These *venæ epigastricæ*, spring from the externall *ramus iliacus*, and by a straight way passe upward under these muscles. From

this ſame branch ſpring the *venæ hypogaſtricæ*, which are inſerted into the neck and bottome of the Matrix.

The Arteries. There are *arteriæ mammariæ* in like manner which ſpring from the *rami ſubclavii*, and get down to the navel. Whither when they are come, they are united by inoſculation with the *Arteriæ epigaſtricæ* aſcending.

Nerves. They have nerves from the fourth intercoſtall nerve, which about the middle of the rib, perforating the intercoſtall muſcle, is divided into four branches which are ſent afterward to the pectorall muſcle, the thicker paſſing to the nipple.

The fat. Between theſe glandulous bodies and veſſels, plenty of fat is placed, to procure ſmoothneſſe and equality to the paps: if this be waſted either by ſickneſſe or old age, the dugs become flaggy.

The figure of the dugs. The paps are of figure round, both that they ſhould be more capable of of milk, and leſs ſubject to bruiſings.

In

In number they are two, that if one ſhould fail, the other ſhould ſupply the defect. Their number.

In Men, women and in Apes, which carry their young ones in their armes, they are ſeated in the breſt. Their ſituation.

1. That the mother ſhould take their pleaſure by upholding the child.

2. That by the talking of the mother, the child ſhould learne to ſpeak and be indued with reaſon.

3. That being neere to the heart, they ſhould receive plenty of heat.

4. For beauty.

5. For convenient giving of ſuck; for the child cannot preſently go when it is born, but muſt be borne in the armes and applyed to the teat.

6. For the commodity of the act of generation.

7. For the defence of the vitall parts.

8. For the incitation of luſt.

9. To be a receptacle of excrementitious humours: So women are often troubled with Cancers.

Of the Nipple.

The nipple is placed in the middle of the dug, where the milkie conduits end. It is a round body ſtanding out, that the infant may take hold of it with the lips. It is of a fungous ſubſtance, that it may admit diſtention and contraction. It hath many holes; which appear when the milk is preſſed out. It is rougher then the other parts of the dug, that the infant may the more firmly hold it. It is of an exquiſite ſence, that the nurſe ſhould finde ſome pleaſure when ſhe giveth ſuck. It is framed of the reduplication of the skin.

What Milk is.

Now the milk which is drawn thorow the holes of it by the infant, is nothing elſe but a white liquor, engendred of the venall and arteriall blood, ſent from the matrix, and altered by the glandules of the dugs; in taſte pleaſant, which eaſily concocted by the ſtomack

ſtomack, and doth ſpeedily and plentifully nouriſh.

As for the muſcles, they are ſet down in the Treatiſe of Muſcles, Cap. 15.

The bones which are ſaid to be the third proper externall containing part, are ſet downe in the Doctrine of bones.

CHAP. III.

Of the proper internall containing parts.

THeſe are in number three, the *Pleura*, the *Mediaſtinum*, and the *Pericardium*.

The *Pleura* hath its denomination from the ribs, under which it is placed, and ſo it may be termed in Engliſh, the Coſtall membrane.

Its ſubſtance.

It is a membrane, white, thin, hard, reſembling the *peritonæum*.

Spigelius de human. corp. Fabr. lib. 6. cap. 3. will have it to be thicker

er and ſtronger than the *peritonæum*, contrary to the opinion of *Riolan*, who affirmeth the *peritonæum* to be thicker and ſtronger; becauſe it is appointed for the ſuſtaining the weight of the guts

Its parts. It is every where double: the inner part is thickeſt, ſmootheſt, and as it were bedewed with a wateriſh humour, that it ſhould not hurt the lungs by its roughneſſe: This wateriſh humour doth ſpring from the vapours raiſed from the blood condenſed, by reſpective coldneſſe of the membrane. The outer part is thinner, yet is rougher; that it ſhould cleave the more firmly to the ribs.

Its figure As for its figure, without it is arched, within hollow; Above it is narrower, below broader, chiefly towards the ſides: From it ſpring ſome ſinewie fibres, by the which the lungs are tyed to it. If theſe be too ſtrait, the motion of the lungs is hindered, and ſo an uncurable difficulty of breathing procured.

Its holes. Above, it is perforate in five pla-

ces,

ces, to give way to the *vena cava*, and the *aorta* ascending the *gula*, the wind-pipe, and the nerves of the sixth paire. Below where it covereth the middriffe, it is perforate in three places, to give way to *vena cava* and the *aorta* descending, as also to the *gula*.

It is framed of the membranes covering the *spinalis medulla*; for those joyning with the sinews of the brest, growing broader produce it. Its beginning.

It hath veines and arteries for nourishment and life; and nerves for feeling. Its vessels.

On each side it hath 12 veines; whereof the two uppermost spring from the higher intercostall branch, and the ten lower from the *vena sine pari*. Its veins.

So many arteries are in like manner; whereof the four uppermost proceed from the superior intercostall, and the inferiour eight from the hinder part of the *aorta*, descending. Its arteries.

It hath twelve nerves in like manner; Its nerves.

mannner; whereof the four branches which ſpring from the *vertebræ* of the breſt are beſtowed upon the forepart, but the hindermoſt branches are beſtowed upon the muſcles, which are placed upon the back.

The ſeat of the veſſels and the pluriſie.

Theſe veſſels are placed between the duplication of the *Pleuræ*; and the pleuriſie it ſelf is not ſeated in this place onely; but between the *Pleuræ* alſo, and the intercoſtall muſcles. It hath two uſes; Firſt, to wrap in all the vital parts. Secondly, to defend them from all externall injuries.

Its uſes

Of the *mediaſtinum.*

The ſecond membrane is the *Mediaſtinum*: becauſe it ſtandeth in the middle of the breſt, and divideth the right ſide from the left.

It hath not only a duplication as the *Pleura* hath, but is double alſo; for one is in the right ſide, the other in the left. They are united according to the longitude of the *vertebræ* of the back; but ſevered towards the *ſternum.*

In

In the cavity between these parts of the *Mediastinum*, one may be deeply wounded, without any great danger of death. Such a wound you shall easily discerne; First, if small store of blood issue out. Secondly, if no breath come out. Observation.

This cavity is seen when the *Cartilago xiphoides* is removed. In the dropsie of the lungs, and when corrupt matter is gathered, the *sternum* here may be tripaned.

The substance of it is membranous, yet thinner and softer than the *Pleura*. The innerside towards the lungs is smooth, and hath fat about the vessels, but the exteriour is rougher, by reason of the fibres, by the which it is tyed to the *Pleura*. Its substance.

It reacheth from the throat to the midriffe. Its largeness.

As for its vessels and arteries, it hath from those called *mammariæ*, but small, and from *vena sine pari*. Its veins. Its arteries.

It hath one speciall veine called *media-*

mediastina, which springeth from the lower part of the *ramus subclavius*.

Its nerves.

The nerves called *stomachici*, passe by the reduplication of it. It hath three uses: First, it divideth the breast and lungs in two parts, that one being wounded, the other should be safe.

Secondly, it holdeth up the *pericardium* firmly, wherein the heart is contained, that it should not rest vpon the back bone, when we lie upon our back; or that it should fall upon the breast bone when we bend our selves towards the ground; or touch the ribs when we lye upon our sides.

Thirdly, it giveth a safe passage to the vessels which passe by it.

Of the *pericardium.*

The third proper containing part is the *pericardium*, so called because it compasseth the whole heart, whose figure it hath, for it is pyramidall It is so farre distant from the heart, as is sufficient to give way to the motion of the same, and the containing of the waterish humour.

It

It hath two membranes: 1. Outer from the *mediastinum*, it is tied before and behinde to the *pleura*; from whence both the *mediastinum* and *pericardium* originally spring. 2. Inner, proceeding from the externall tunicles of the vessels of the heart: for within the *pericardium* the vessels lack their common tunicle, it having been spent upon the *pericardium*. Its membranes. Its connexion. Its beginning.

The externall membrane is fibrous; but the internall is slippery, but firm and thick. The motion of it is secondary from the heart.

It leaneth more to the left side then to the right, and more to the fore then back part. It cleaveth so firmly to the nervous circle of the midriffe, that it cannot be separate from it without rending, to direct the motion of the heart. Its situation.

It is perforate in five places. In two, for the entring in and passing out of the *vena cava*. In three for *vena arteriosa*, and *arteria venosa*, and the passing out of the *aorta*. Its holes.

It

Its veſſels.

It hath ſmall veines from the *phrenicæ*, and the axillar. No arteries appear, becauſe it is neer enough to the heert.

Its uſes.

It hath two uſes: Firſt to keep the heart in its own place, whether we bend our bodies backward, forward, or to either ſide.

Secondly, to contain the wateriſh humour which is ſundry wayes profitable: for firſt it tempereth the heat of the heart: Secondly, it moiſteneth the ſame. Thirdly, it maketh it ſlippery: Laſt of all the *pericardium* defendeth the heart as an armour from all exeernall injuries.

The wateriſh humour in the *pericardium*.

The wateriſh humour which is contained in the *pericardium*, is like urine, yet not ſharp or ſaltiſh. If it be thick and ſlimy, it cauſeth the heart to be hairy. If it be too copious, it cauſeth the panting of the heart, which is cured by phlebotomy; it is too plentifull in thoſe who have obſtructions of the meſaraicall veines, liver, or ſpleen: for in ſuch the thinneſt part of the *chylus* only

ly is drawn for nouriſhment, and ſo the blood becometh wateriſh.

Some think it to proceed from a ſeminall aquoſity, even from the firſt generation: as the aire within the eares is from a flatuous. Others think that it is ingendred of vapors raiſed from the blood, and wateriſhneſſe of the veines and arteries of the heart, and condenſed by the reſpective coldneſſe of the membrane, and by this means the *peritonæum* and the *pleura* ſeem alwayes bedewed with moiſture.

Its generation.

It ſeemeth that the firſt beginning of it is a ſeminal humidity, and that is maintained afterward by the vapors.

Sometimes alſo there is contained in the capacity of the breſt, a bloody water to moiſten and temper the heat of the lungs.

It is cauſed partly of the vapours raiſed from the veſſels, partly of that portion of drink, which paſſeth to the lungs: and by reaſon of this water and blood did flow from the ſide of our Saviour pierced.

The bloody water in the capacity of the breſt.

CAP.

Cap. IV.

Of the trunck ascending from the Vena Cava.

NOw the parts contained in the breast, are either *vasa* or *viscera*, the vessels or the entrals.

The vessels are in number four the *vena cava*, the *vena arterialis*, the *arteria venosa*, and the *aorta* or *arteria magna*.

The *Vena cava.*

The first is the *vena cava*, or *magna*, because the hollowness of it is great. It hath its beginning from the liver. The orifice of it is three times as large that of the *aorta*: being received by the right ear of the heart, it is expanded into the whole right ventricle of the same.

Its valvs.

About the orifice of it are placed three valves called *trifulca*, or *tricuspides*: because arising from a large foot, they end into a narrow top representing barbed arrowes.

Their situation is from without inward, so that the blood may be let

let in, but not to returne. They proceed from a membranous circle, annexed to the orifice: They cleave to the *ſeptum* of the heart; towards the point of it be ſtrong fibres ending in round caruncles.

If you would ſee theſe as the reſt of the valves, cut tranſverſly the ventricles of the heart neer to the *baſis*, and then they will appeare.

It hath two trunkes; one deſcending, and this is that which is cauſed of a number of ſmall veins, appearing in the hollow part of the liver, which meet about the middle of it in one trunk ſtill decreaſing in number, and increaſing in bigneſſe. The trunk deſcending.

The other aſcending; this is procured by a number of ſmall veins, ſpringing from the convex part of the liver, which end in lik manner into one trunk about the middle of it. The trunk aſcending.

This is bigger than the deſcending becauſe all the upper parts are fed by this only; whereas moſt of the

the parts contained in the abdomen, are nouriſhed by the *vena portæ*.

The laterall ſprigs of the trunk aſcending 1 *Phrenica.*

Although it be not divided into branches untill it come to the throat; yet it doth ſend forth ſundry ſprigs from the ſider.

The firſt is called *phrenica*, one in each ſide. It is inſerted into the *diaphragma*, which is called ὑπόζωμα, by a number of twigs, and from thence it beſtoweth twigs upon the *pericardium* and *mediaſtinum*.

The ſecond is called *Coronaria*, ſo called becauſe like a garland it compaſſeth the *baſis* of the heart. It ſendeth ſundrie twigs to the outer parts of the heart; but chiefly to the left: becauſe it needeth greater ſtore of nouriſhment, by reaſon of its ſtronger motion.

This hath a valve which hindereth the returne of the blood, to the *vena cava*. This ſpringeth from the *cava*, before it enter into the heart, and the blood is ſomewhat thick, and not attenuate in the ventricles of the heart; for the ſubſtance

substance of the heart being hard and firm, was to be nourished by blood somewhat grosse.

The third is called ἄζυγος, or *sine pari*, without a mate; because it hath not a fellow as other veines have in the left side, if you accept those beasts which chew the cud. 3. *Vena sine pari.*

This springeth from the *cava*, as soone as it is come out of the *pericardium*. It passeth out of the hinder and right part of the *vena cava*, about the fifth *vertebra* of the breast. It doth not descend straight way: But comming a little forward, it returneth towards the *spina*.

When it is come to the eighth or ninth rib above the *spina*, it is divided into two branches, to wit, the right and the left; Then passing by the division of the midriffe, which is between the two productions of it, they are spred thorow the abdomen. Of these two, the left is inserted into the left emulgent.

By which way matters in the breſt are diſcharged.

By this way *Fallopius* will have watriſh, purulent and bloody ſubſtances to be diſcharged, which ſometimes are contained in the breſt, while theſe branches march downward: In each ſide ten ſprigs bud out, which march thorow ſo many diſtances of ſo many of the inferior ribs.

In the lower part of the rib, there is a groop to receive the ſprig. Wherefore when you make inciſion in an *empyema*, come not neer to this part. From this veine other ſmall twigs alſo proceed; which afford nouriſhment to the *ſpinalis medulla*.

Theſe are called *coſtales inferiores*, or the lower intercoſtals. The *vena ſine pari* thus being framed, the *cava* aſcendeth to the *jugulum*, ſtrengthned by the *mediaſtinum* and the *thymus*; which is placed in the uppermoſt part of the breſt.

The divarication of the *Vena cava*.

Here the *vena cava* is parted into two remarkable branches: From whence all thoſe veins ſpring, which are ſent either to the head or armes.

One

One branch marcheth to the right, another to the left ſide: while they remain within the breſt, they are called *ſubclavii*, becauſe they march under the cannel bones; but when they are come to the arm-pits, they are called *axillares*.

Sprigs proceeding from the *Cava* within the breſt

Before they come to the arm-pit, ſundry ſprings ſpring from them.

1. *Intercoſtalis ſuperior.*

The firſt is *intercoſtalis ſuperior*, this ariſeth from the root of the divarication; and paſſing from the root of two ribs beſtoweth twigs upon the diſtances of the two upper ribs, as the *vena ſine pari* did: there is one in each ſide.

2. *Mammaria.*

The ſecond is called *mammaria*; this marcheth forward towards the upper part of the bone of the breſt from thence it goeth down by the ſides of it, and when it is come to the *cartilago mucronata*, about the ſides of it, it paſſeth out of the breſt, and marcheth by a ſtraight way under the ſtraight muſcles to the navil, where it is joyned with the *vena epigaſtica aſcen-*

aſcendens by inoſculation: which is the cauſe of that great conſent, which is between the paps and the matrix. This before it leave the breſt, it beſtoweth one branch upon the cartilaginous diſtances of ſeven of the *coſtæ veræ*, where the ſprigs of the *vena ſine pari* end. From theſe branches proceed ſome other remarkable twigs, which are beſtowed upon thoſe muſcles which are ſeated upon the breſt, and the dugs.

3. *Mediaſtina.*

The third is called *Mediaſtina*, becauſe it is beſtowed upon the *mediaſtinum* together with the left nerve of the midriffe according to the length of it.

4. *Cervicalis.*

The fourth is called *Cervicalis* or *vertebralis*. It is large in each ſide, marching upwards obliquely towards the back part, it commeth to the tranſverſe proceſſe from the *vertebræ* of the neck, where paſſing thorow the holes of them, it beſtoweth branches upon the muſcles which lie above the *vertebræ*.

The

The fifth is called *Muſcula inferior*, becauſe it is ſpent upon the lower muſcles of the neck, which ſtretch out the neck and head. 5. *Muſcula inferior*

The ſixth is the internal jugular; this ariſeth where the cannel bone is articulate with the *ſternum*. This joyned with the nerve recurrent, and the ſoporall artery, marcheth by the ſide of the wind-pipe to the throat. 6. The internall jugular.

The ſeventh is the externall jugular; this marching up under the skin, and the quadrat muſcle which pulleth downe the cheeks commeth to the ear. This in beaſts is bigger then the internal, otherwiſe then it is in man. The externall jugular.

CAP. V.

Of Vena arterialis, and arteria venalis.

The ſecond veſſel in the breaſt is *Vena arterialis*. It is a veine from its office: for it carrieth *Vena arterialis.*

naturall blood to the lungs by the right ſide of the wind-pipe: It is called and artery, becauſe the coat of it is double, not ſingle as that of veines, it doth ſpring from the upper part of the right ventricle of the heart, and is implanted into the ſubſtance of the lungs by the right ſide of the wind-pipe.

Arteria venalis.

The third veſſel is *arteria venalis*. It is called an artery, becauſe it carrieth arteriall blood; but a veine, becauſe it hath a ſingle coat as a veine. It ariſeth from the upper part of the ventricle of the heart, and is implanted into the ſubſtance of the lungs by the right ſide of the wind-pipe.

The valves of theſe two veſſels.

The *Vena arterialis* hath three valves called *Sigmoides*, from the figure of great *ſigma*, which anſwereth the Latin S, the figure is this *C*. They look from within outwards, to let out the blood; but to hinder the return of the ſame.

The *Arteria venalis* hath two valves called *mitrales*, becauſe they are

are like a Biſhops Miter. They look from without inward, to let in blood carried from the *vena arterialis*. They are bigger than thoſe of *vena cava*; and have longer filaments, and to ſtrengthen them many fleſhy ſnippets are joyned to them.

It hath two valves only, that the fuliginous vapours might the more readily be diſcharged.

It hath alſo but a ſingle thin coat, partly for the ſame purpoſe, partly becauſe the blood ſent from the *vena arterioſa* is cooled by the *bronchia* of the lungs, before it entereth into *arteria venalis*: it needeth not ſo thick a coat as an arterie; and becauſe veins only carry in blood, and arteries carry out; Therefore *arteria venalis* is placed in the left ventricle, and *vena arterialis* in the right. Both theſe veſſels not far from their beginning, are divided into two branches, whereof the one paſſeth to the right part of the lungs, and the other to the left; and each of theſe is ſubdivided into other

branches, untill at the laſt they end in ſmall threds.

The greater branches accompany one another, ſo that the vein ſtill marcheth with the *arteriæ* joyned together by many inoſculations or *anaſtomoſes*.

Between them the branches of *aſpera arteria* march. Theſe veſſels are great, becauſe the lungs by reaſon of their perpetual motion require much nouriſhment.

How the blood is carried to the left ventricle of the heart.

Firſt, the blood is carried into the lungs by *vena arterialis*, and from hence to *arteria venalis*, by ſundry *anaſtomoſes*, and from hence to the left ventricle of the heart. Where being made ſpirituous, it is ſent by the *aorta*, to impart life to the whole body.

One thing is to be noted, that no air in its proper ſubſtance is carried to the heart: for the blood contained in theſe two veſſels, is ſufficiently cooled by the *bronchia* paſſing between them.

How the blood is cooled.

The blood is cooled. Firſt, by ſtaying in the lungs while it is in paſſing.

Se-

Secondly, by touching the *bronchia* cooled by the attraction of fresh air: And thirdly, by the continual motion of the lungs.

One thing is to be noted, That in *arteria venosa* a little below the valves there is found a little valve ever open. It being removed, there appeareth a hole, by the which the blood passeth freely from the *vena cava* to it, and returneth by reason of this *anastomosis*; that the blood in the veines may be animate.

CAP. VI.

Of the great arteries, and first of the trunk ascending of the same.

THe fourth vessel is the great artery called *aorta*; because it receiveth the air. It springeth from the upper part of the left ventricle of the heart, where it is largest and hardest. *Coronariæ arteriæ.*

Before it come out of the *Peri-*

cardium, it ſendeth two ſmall twigs, from each ſide one, which compaſs the *baſis* of the heart like a garland, and ſend down according to the length of the heart other twigs: Theſe are called *Coronariæ*. Theſe twigs are more in number, and larger about the left ventricle then the right, becauſe it requireth greater plenty of nouriſhment, by reaſon of its ſtronger motion, which digeſteth much blood.

The ſituation of the *aorta*.

It is placed between the windepipe and the *vena cava*, tyed to the mouth of the ſtomack, paſſing under the trunck of *vena arterioſa* upward: when it hath pierced the *Pericardium*, it is divided into two trunckes whereof the one is called *truncus aſcendens*, the aſcending trunck: The other *deſcendens*, the deſcending.

Its trunks.

Of theſe two the deſcending is largeſt, becauſe it miniſtreth life to more parts.

The branches of the trunk aſcending.

This aſcending trunck before it paſſes to the armes, is divided into two

two branches, whereof one paſſeth to the right, the other towards the left arme; they are called *ſubclavii rami*, becauſe they march under the cannell bones. When they are gone out of the breſt, they are called *Axillares*. From both the lower and upper part of both theſe branches, ſundry ſprigs doe ſpring.

From the upper part proceedeth *intercoſtalis ſuperior*, which beſtoweth twigs upon the diſtances of the uppermoſt foure ribs. From whence others are ſent to the adjacent muſcles, and the *ſpinalis medulla*. From the upper part.

From the lower ſpringeth that branch, which is called *Cervicalis*, but more fitly *Vertebralis*; for it ſpringeth behind where the *vertebræ*; from thence marching upwards it beſtoweth twigs upon the *ſpinalis medulla*, which enter by the paſſages, by the which the nerves, alſo upon the muſcles, which are placed in the hinder part of the necke, and at the laſt ente- From the lower part.

entereth into the *Cranium*, by that hole, by the which the *ſpinalis medulla* deſcendeth from the brain.

This with its fellow when it is come to the cell of the wedg-like bone on each ſide of it, between the firſt and ſecond pair of ſinews, having been divided, cauſes *Plexus coroides*.

2. The ſecond, the *Arteria mammaria* which accompanying the *Vena mammaria*, is joyned with the *epigaſtrica arteria*, aſcending by inoſculation about the navell.

3. The third is that called *Muſcula*, and is diſtributed upon the muſcles of the neck.

4. The fourth is the ſoporall, one on each ſide; ſo called, becauſe if they be ſtopped, ſleep doth immediately follow.

Theſe ſoporall arteries, when they are come to the throat, they are divided into two branches, to wit, the externall, which is leſſer, and the internall which is larger.

The

The externall beſtowes twigs upon the muſcles of the face, upon the roots of all the teeth of the lower jaw, having entred into the cavity of the mandible, and going out upon the chin.

The internall branch, when about the throat it hath beſtowed twigs upon the tongue and larynx, about the lower part of the skull, it is divided into two branches; whereof the leſſer and hindmoſt accompanying the branch of the internal jugular marcheth toward the hindermoſt part of the skull, and entering at the ſecond hole of the nowle entereth into the hollowneſſe of the *Dura mater*.

The formoſt and largeſt, when it hath entered into the cavity of the skull, thorow its proper hole in the parietall bone, and is come to the cell of the wedge-like bone, it maketh *rete mirabile*; which in beaſts is large, but in man very obſcure.

CAP.

CAP. VII.

Of the descending trunk of the Aorta.

THE descending Trunk of the *aorta* about the fifth *vertebra* of the breſt bending towards the left ſide, marcheth downwards towards the laſt *vertebra* of the loynes.

In this march it ſendeth forth ſundry branches, which are theſe:

The branches of the trunk deſcending.

1. Intercoſtall inferior arteries in number eight. 2. *Phrenicæ* two, 3. *Cœliacæ* one. 4. *Meſenterica ſuperior.* 5. *Emulgentes* two. 6. *Spermaticæ* two. 7. *Meſenterica inferior.* 8. *Lumbares.*

1. The inferior intercoſtals.

The inferior intercoſtall arteries, accompanying the veines and nerves of the ſame denomination march according to the length of the lower part of the ribs, where there is a hollowneſſe to receive them, and in the true ribs end, where the cartilages begin; but in the

the ſhort ribs they goe a little further, even to the ſides of the lower belly.

Theſe ſend ſprigs by the holes of the nerves to the marrow of the back and to the muſcles, which reſt upon the *vertebræ* of the back.

Theſe not onely afford ſpirits and blood to the intercoſtal muſcles, but carry alſo quittour and water gathered in the cavity of the breſt, ſent by the trunck of the *aorta* to the bladder by the emulgent arteries, according to *Spigelius lib. 6. cap. 4.* where *Fallopius* will have theſe matters to be ſent by *vena ſine pari*; but this is a ſhorter way.

By what way quittour and water is ſent from the breſt to the bladder.

Phrenicæ are two, one on each ſide: they ſpring from the trunk as ſoon as it is come out of the cavity of the breſt, and being ſpread into many twigs, whereof the moſt are beſtowed upon the lower part of the midriffe where the *vertebræ* of the back are; and ſome alſo upon the upper part which afterward

2. *Phrenicæ.*

ward passe to the *pericardium* where it cleaveth to the midriffe.

3. *Cœliaca* — *Cœliaca* is one, so called, because it sendeth twigs to the stomack. This springeth from the fore-part of the trunk. This bestoweth branches upon the stomack, liver, gall, caul, the *duodenum*, the beginning of the *jejunum*, to a part of *Colon*, to the *Pancreas*, and spleen.

4. *Mesenterica superior* doth arise a little below the *cœliaca*, accompanying the *vena mesaraica*. It bestoweth many twigs upon the hungry and *Ilium* gut; as also upon that part of *Colon* which lieth between the hollow part of the liver, and the right kidney. So that this branch is bestowed upon the upper part of the mesentery.

5. The emulgent arteries are two, the right and the left. They spring from both the sides of the trunk under the former, where the first and second *vertebræ* of the loynes are coupled by a ligament. The left is lower then the right. These when

when they are come to their kidneys, are divided into two branches, which are inserted into the cavities of the kidneyes and by innumerable ſmall twigs are ſpent upon the ſubſtance of the kidney. The uſe of theſe, beſides the common, is to diſcharge the ſeroſity of the arteries, whereof they have great ſtore.

Spermaticæ, or *ſeminales*, the Seminary; they are in like manner two, which ſpring from the forepart of the trunk. 6.

The left artery doth not ſpring from the left emulgent artery as the veine doth. Theſe marching downward, accompany the veins of their ſide. In men they are carried to the ſtones by the productions of the *peritonæum*; but in women when they are come neer to the ſtones, they are divided in two branches; whereof the one is beſtowed upon the ſtones, and the other upon the bottome of the matrix, in the ſide of it.

Meſenterica inferior, it ſpringeth about 7.

about the *os ſacrum*, from the trunk a little above, before it ſendeth forth the *rami iliaci*. It is beſtowed upon the left part of the *Colon*, and the *rectum*; and accompanieth the Hæmorrhoidicall veines to the *anus*.

Lumbares rami, the Loyne-branches, in number foure: They ſpring from the back part of the deſcending trunk of the *aorta*. Theſe paſſe to the *vertebræ* of the loynes, and their marrow by their holes, as alſo to the adjacent muſcles. Some things here offer themſelves to be obſerved.

1. That when either the colicke is changed into the gout, or contrarywiſe the gout into the colick; if the laſt happen, then the humors are ſent from the crurall arteries to the trunke, and from thence to the meſentericall branches of the arteries; and from thence to the guts. If the firſt happen, then the humours paſſe the contrary way. *Read Hip. 6. Epip. Sect.* 4.

2. If the colicke turne either to

to a palſy, or falling ſickneſſe, as it may fall out according to *Æginet. lib.* 3. *cap.* 43. then the humour doth return from the *Colon* by the meſenterical arteries, to the trunck; and from hence to the *Lumbares*, which being filled compreſſe the adjacent nerves: from whence difficulty of going enſueth; which may be called an imperfect palſey. If the falling ſickneſſe be procured, the humour is ſent by the groyn-arteries, and thence to the brain.

3. Clyſters may purge the whole body: for the clyſter moiſtning the whole *Colon*, may by the twigs of the arteries draw noiſome humours from the trunck, and when purgation is cauſed by annointing but the navel (which often falleth out in uſing the unction for the pox) or vomiting by miniſtring a clyſter, wherein white Hellebore is, firſt the arteries draw the force of the medicaments, and this ſame faculty again doth purge by the arteries.

9. *Ar-*

9. *Arteriæ ſacræ*, or thoſe branches which goe to the *os ſacrum*. They ſpring from the lower part of the trunk before it ſendeth out the *rami iliaci*. They are ſomewhat large. They marching downward, and leaning upon the *os ſacrum*, enter into the holes of it, and ſo paſſe to the marrow, and hinder part of the ſame. By theſe the matter which cauſeth the cholick may paſſe to procure the palſey of the legs.

10. *Iliacæ arteriæ*, theſe ariſing below the former, about the lower *vertebra* of the loynes, mouut above the veine, leſt it ſhould be hurt by the hardneſſe of the *os ſacrum*, in their continual motion.

They bineg in number two large branches, called *Arteriæ iliacæ*, or flanck arteries, and marching downward to the thigh obliquely, they repreſent the Greek Λ inverted. Theſe a little below the diviſion of the trunk are ſubdivided into two branches, to wit, the internal

ternall or leſſer *Iliaca*, and the external or greater.

The internall hath two branches; The one is called *Glutæa*, and with a vein of the ſame denomination, is beſtowed upon the muſcles which make up the buttocks: The other is called *Hypogaſtrica*.

This is large; this being carryed directly to the lower part of the *os ſacrum*, in men it beſtoweth twigs to the bottome and neck of the bladder and to the ſtraight Gut; but in women, wherein it is larger, it ſendeth plenty of twigs upon the bottome and neck of the matrix beſides the former parts. The externall or greater hath two branches.

The firſt is called *Epigaſtrica*. It ſpringeth from the outer part of the artery a little before it paſſe thorow the *Peritonæum*; and turning upwards it mounteth upwards by the inner ſide of the ſtraight muſcle of the belly: and about the navil it is inoſculate with

with the *arteria* descending.

The second is called *Pudenda*: This is but a small branch, and when it is come out of the *peritonæum*, it passeth obliquely by the joyning of the *os pubis*, and is bestowed upon the skin of the secret parts.

A note. One thing is to be noted, that the *Arteria umbilicalis* springeth from the internall *iliaca*; and going along the great artery, is firmly tied to the bladder by strong membranes.

When the child is in the belly, it is hollow; but without hollownesse when the infant is born.

The Valves. About the orifice of the vessels, eleven valves are to be seen if the ventricles of the heart be dissected transverse neer to the *basis*. Of these some are called *trisulcæ*, and resemble a barbed arrow; some *Semilunares*, or *Sigmoides*, because they resemble a halfe moon, or the Greek letter called *C*. Those bend inwards, because they are set before the vessels which carry in blood.

They

They bend outward, becauſe they are appointed for the veſſels which carry out the blood.

The *Vena cava* hath three *Triſulcæ*; but the *Arteria venoſa* two.

The *Aorta*, and *vena arterioſa* have three *Sigmoides*.

CAP. VIII.

Of the parts ſimilary externall parts.

HItherto of the veſſels of the breſt: Now follow the entrals, which are in the heart and lungs. The heart in Latine is called *cor*, from the Greek word καρδία, from καρδία; ſo called by reaſon of the ſoveraignty which it hath above other parts of the body; or from καρδία, which is derived from καρδαίνεσθαι, becauſe it is toſſed with continuall motion: of figure it is *pyramidall*. The Ancients likened it to a Pine Apple. Its appellation. Its figure.

As

Its bigneſſe.

As concerning its bigneſſe, it is larger in man then in beaſts, if you conſider the ſtature of his body. The external ſuperficies of it is ſmooth, but within it is unequal, and hath many fibres.

Its ſubſtance.

The ſubſtance of it is fleſhy, red, and compact. It is ſix inches in length, and four in bredth. It

Its connexion.

is tyed above to the *mediaſtinum*, below to the *diaphragma*, by means of the *pericardium*.

Its parts.

The parts of it are either diſſimilary, or ſimilary.

Its diſſimilary parts.

The diſſimilary are two, to wit, *Baſis*, or the head which is round and broad, and *mucor*, or *apex*, the ſmall point, which doth bend towards the left ſide, and forwards under the left pap, where one may feel the motion of the heart.

The ſimilary External 1.

The ſimilary parts are either external, or internal. The externall are four, to wit, the fat, the membrane which covereth it, its veſſels, and the eares.

The fat.

The fat is more copious in man than in beaſts

beasts, chiefly in the upper part, where the vessels passe out.

The membrane with the which the heart is covered, is thin, and cannot be separated from it. The vein whereby it is nourished is called *Coronaria*; because in figure it is like to the Crowns of the ancient Kings; for it compasseth the *basis* of the heart round about, and from thence sendeth branches to the whole substance of it, even to the point of it. In the right side they are fewer and lesser; but in the left thicker and larger. This vein springeth from the ascending trunk of *vena cava*, a little before it entereth into the right ventricle.

The membrane. The vein

Arteria Coronaria compasseth the *basis* of the heart, as the veins doth, and sendeth sprigs to the whole heart, but chiefly to the left side. It springeth from the beginning of the *aorta*, before it passe thorow the *pericardium*.

The Arterie.

It hath nerves from the sixth conjugation, but small; bestowed upon the

Nerves.

baſis neer the *vena arterioſa*.

The ears

The laſt external part are the ears, both becauſe they are like to the ears of a dog, and are faſtned to each ſide of the heart, as ears to the head. Their ſubſtance is nervous: they have three ſorts of *fibres*, and are not much thicker then the skin. In figure they are pyramidal, ſomewhat ſharp at the top: they are unequall both without, and within; yet they being full of blood, the externall ſuperficies ſeemeth ſmooth. In number they are two; the right which is ſeated before the orifice of the *vena cava*, and the left ſeated before the *arteria venalis*. They differ; for firſt, the right is largeſt; ſecondly, the left is harder, more fleſhy, and thicker: thirdly, the left is more pointed, and broad. The motion is contrary to that of the heart; for when the heart is dilated, they are contracted to expel, and contrariwiſe. The blood is firſt of all received and ſtayed in theſe ears, and for two reaſons

reaſons. Firſt, that the whole heart ſhould not be too much ſtretched by the influx of blood, and ſo the dilatation and conſtriction of it hinder; as we ſee in a bladder too much filled with water. Secondly, that the veſſels would not burſt, and ſo when the heart is dilated, they are contracted; and ſoftly pour in the blood. They are two, becauſe there are two veſſels which carry in blood to the heart, to wit, *vena cava*, and *arteria venoſa*; and becauſe the *cava* is larger then the *arteria venoſa*.

The ſubſtance of the ears is nervous, becauſe they were to admit dilatation and conſtriction, The veines hath a ſimilunary valve to hinder the reflux of the blood, when the ear is contracted. The fat about the heart moiſteneth it; and yet is not melted by the heat thereof, becauſe it is ſuet and not greaſe.

Cap. IX.

Of the similary internal parts.

THe internall parts of the heart are the two ventricles, the right and the left, and the *septum*.

Of the Ventricles.

How the Ventricles differ.

The ventricles do differ in these points. 1. in bigness; so the right is much bigger then the left; for it reacheth from the *basis* to the *mucro*. 2. in the blood contained; for the blood in the right ventricle is venal, but in the left arterial. 3. In figure for the right is semi circular, but the left orbicular. 3. the left ventricle is placed exactly in the middle of the heart: for the right seems only to be an appendix set onely to the side. 5. The left ventricle is of a more solid and compact substance, and is three times thicker then the right. 6. The right ventricle was appointed by nature to minister nourishment to the lungs; but the left

left to be a ſtore-houſe of vital blood whereby it is communicate to the whole body. If you diſſect the heart according to the longitude from the *baſis* to the point, you ſhall finde the internall ſuperficies very unequall, full, as it were, of pits; yet the left ventricle is moſt unequal. In both theſe ventricles you may note ſome fleſhy fibres ſpringing from the *mucro* of the ventricles, which becomming membranous, fibres are inſerted into the lower parts of the valves. There are five in the right, but in the left two onely, yet more thick and ſolid.

The action of the heart is called *pulſation*. The cauſe of this is a peculiar faculty granted to the heart, flowing from the forme of it. The pulſation hath two motions, dilatation and conſtriction.

The action of the heart

In dilatation the *mucro* is drawn to the *baſis*; for ſo it becommeth ſpherical and more capable. In this motion it draweth blood to it ſelfe from the trunke of the

Dilatation.

vena cava. This motion is performed when the ſtraight fibres are contracted, and the tranſverſe relaxed.

Conſtriction. In conſtriction the *mucro* doth fall from the *baſis*, and ſo the heart becommeth narrower. by this motion the vitall blood is expelled out of the heart. This motion is performed by the conſtriction of the tranſverſe fibres. Between theſe contrary motions we muſt imagine ſome reſt.

The *Septum*. Theſe ventricles are divided by the *ſeptum*, which is nothing elſe but the right wall of the left ventricle; wherefore the right ſide is bunched, but the left hollow. It is unequal as the ventricles. The pits are not permeable, and ſo no blood can paſſe through the *ſeptum*, from the right to the left ventricle.

CHAP.

CHAP. X.

Of the frame of the Lungs.

THe ſecond intral of th: breſt, to wit, the Lungs follow, called in Latin *Pulmo*, and in Greek πνεύμων; becauſe they are the inſtruments of breathing: we are to conſider their frame and action.

As concerning their frame, theſe things are to be marked. 1. The ſubſtance. In a man it is of the colour of a Roſe, ſpongious and light, ſo that it ſwimmeth in water: but in a ch ild in the womb it is redder, harder a nd heavier, and doth ſink in water; b ecauſe it is fed with venall blood, derived from the *vena cava* to *arteria venoſa*, by *anaſtomaſis*. Its ſubſtance.

2. The *Lobes*, they are ordinarily two, ſometimes three. If there be two, the upper is ſhorter then the lower. They cleave toget her by Its lobes.

by membranous tyes: they are like to the horne of an Ox; for towards the breſt they are bunches, but towards the back hollow.

Its membrane.

The lungs are covered with a membrane. It is framed of the common coat of the veſſels, which are beſtowed upon the lungs. It is thin, ſoft, and very porous, to give way to noiſome matters, which ſometimes are carried to the *aſpera arteria*, to be voided by ſpitting.

Its veſſels.

3. As for its veſſels; veins it hath from the *vena arterialis*, which paſſeth out of the right ventricle of the heart. Arteries it hath from the *arteria venoſa*. The firſt beſtow nouriſhment, the ſecond, life. As ſoon as they touch the lungs, they are divided into two branches, and thoſe into more, untill at laſt they end into thred-like twiſts. It is fed neither by the *vena cava*, nor *portæ*; becauſe the blood contained in theſe is too groſſe; for they require for nouriſhment a blood, between venall and

and arteriall, which is not seen in any other part of the body. The blood is carried from the right ventricle of the heart, from the *vena arterialis* to the *arteria venalis*. And so the hot blood of the left ventricle is cooled; as the meane boyling of a pot is stayed by powring in some cold water. It hath a small nerve from the sixth conjugation which goeth no further then the membrane which affordeth but a dull feeling.

The cooling of the blood of the heart.

4. The winde-pipe remarkable is in Latine *aspera arteria*. It is called an artery, because it receiveth in the aire by inspiration: *aspera*, because its substance is unequall.

The Winde-pipe. Its denomination

It may be thus described: It is a long pipe framed of round cartilages, tyed together by membranes, ever open, which beginning at the lower part of the throat, and resting upon the mouth of the stomack, is implanted into the lungs by many branches. It hath two parts; the upper,

Its description.

Its parts.

The *rima*

which is called *larynx*; and the lower, which is called *bronchus*. In the upper part there is a chink that the aire passing thorough a narrow passage might cause a sound. The instruments of the voice are moistened by the glandules, to cause the cleerer sound.

Its frame

The wind-pipe is not altogether cartilaginous; for so it could have have been dilated; nor altogether membranous, for then it would have shrunk together: whereof the cartilages are tyed together by membranes. These cartilages are like to the Greek *C*. The winde-pipe then beginning under the annular cartilage of the *larynx*, it passeth downward straight-waies, becomming by degrees smaller, it cleaveth by a membrane to the mouth of the stomack: and about the fourth *vertebra* of the brest, it is divided into two branches, the right and the left, which enter into those sides of the lungs; and so the branches encrease and grow lesser, untill at the

the laſt they end by ſmall twigs, about the ſuperficies of the lungs. They are called *bronchia*. Theſe are framed of a whole circle, being round. Theſe are placed between the branches of *vena arterialis* and *arteria venalis*, to coole the blood: The arterie being in the fore-part, the vein in the hinder. Bronchia.

It hath veins from that branch of the externall jugular, which paſſeth to the mouth. Arteries it hath from the great and deep branch of the ſoporal which paſſeth to the throat. Nerves it hath from the ſixth conjugation, called *recurrentes*; becauſe having marched downward, they turne up again to the muſcles of the *larynx*. Two pair of glandules are placed at the ſides of the *larynx*; the firſt pair is ſeated at the ſides of the *uvulula*, about the root of the tongue. They are covered with the common membrane of the mouth; they receive the ſuperfluous humidity of the brain, and turne it into ſpittle. They are called *tonſillæ* Its veſſels. Glandules.

tonsillæ, and by Chirurgions *amygdalæ*.

The second pair in the lower part of the *larynx* rest upon the buckler-like cartilage. These in women, by reason of their moist temperature swelling, cause their necks to be round, whereas in men, chiefly of a dry complexion, they becomming lank discover protuberance of the fore-part of the *larynx*, which is called *pomum Adami*.

Its membranes.

It hath two membranes; one external and thin from the *pleura*, cleaving fast to the tyes of the cartilages.

The parts of breathing.

The other internal from that which covereth the roof of the mouth, of a thicker substance, having straight fibres, and bedewed with an unctuous humour to withstand sharp rheums, of an exquisite sense; so that if but a crum chance to fall into it, will be like to strangle one.

CHAP.

CHAP. XI.

Of the action of the Lungs.

THe action of the lungs is called *reſpiratio*, or breathing: this is nothing elſe but the taking in and letting out of the air by the wind-pipe, that the heart the wel-ſpring of the vital heat may be cooled.

Breathing is performed by two actions; to wit, inſpiration and expiration. Inſpiration is performed when the lungs are dilated, for then the air is drawn in; but expiration happeneth when the lungs are contracted, for then the air is compelled.

The blowing of a pair of bellows doth expreſs theſe actions, Dilatation is cauſed by the elevation of the breſt, but contraction by falling down of the breſt. The breſt is dilated by the eleven external intercoſtal muſcles, all which perform the office of one muſcle

muſcles. Theſe ariſe from the upper rib, and end by an oblique paſſage in the lower rib. The breſt is contracted by the eleven internal intercoſtal muſcles; contrary to the former in their beginning, inſertion, and office: they croſs one another in form of Saint *Andrew's* Croſſe; ſo that the motion of the lungs doth proceed from the motion of the breſt. The connexion of the lungs doth make this manifeſt; for above they are faſtened to the neck and back by the wind-pipe; in the forepart to the *ſternum*, behind to the *vertebræ*, by the *mediaſtinum*; below to the midriff by ſome *fibres* which ſpring from the upper membrane of the *pleura*.

CHAP. XII.

Of the neck.

THis part is called *Collum*, not a *Colendo*, becauſe it uſed to be adorned with chains; but

but becauſe it riſeth from the ſhoulders *inſtar collis* like a hil, it comprehendeth the diſtance between the head and breſt. It was framed for the winde-pipe and mouth of the ſtomack. Its denomination

The parts of it are either containing or contained. The containing are the ſame which are found in the reſt of the body, ſaving that the *membrana carnoſa* ſeemeth to be fleſhy. Its parts Containing.

The parts containing are theſe.

1. The *larynx* which is the upper part of the winde-pipe. When the gullet bendeth downward in ſwallowing, this ſtarteth upward to give way to ſwallowing. Contained.

It is framed of five cartilages: The cartilages of the *larynx*

1. Is *cutiformis*, or buckler-like; for within it is hollow, but without emboſſed; that part which ſticketh out is called *pomum Adami*, and is greater in men than in women. 2. Its *Annularis*, becauſe it is like a Turkiſh ring, and compaſſeth the whole *larynx*; in the hinder part it is broad and thick.

2. And

3. And 4. Its *Guttalis*, becauſe it reſembleth the neck of an ewar: this is double. They have upper and lower proceſſes; the upper are ſoft, flaggy, bending outwards, being joyned together they are like the neck of an ewar: They make up the *Glottis*.

Glottis. 5. Is the upper part, and within the *Scutiformis*. It is ſoft and called

Epiglottis *Epiglottis*, becauſe it is placed above the *glottis* or chink, and covereth it. It is of the forme of a tongue. It is appointed to hinder the falling downe of any thing which may prove offenſive unto the winde-pipe when we eat or drinke. It is preſſed downe by the weight of the things which are taken by the mouth, and turneth them down to the *gula*. Being ſuſpended by a ligament, being preſſed downe it riſeth up immediately. 2. Part contained in the mouth of the ſtomacke. It is called *Pharynx* from

Pharynx. φάρυγξ, becauſe it conveyeth the meat and drink to the ſtomacke. It is fleſhie. The attraction of it is performed

formed by the ſtraight; but the expulſion by the orbicular fibres. 3. Is the *uvula*: It is a red, fleſhy, and fungous ſubſtance. It is covered with the red application of the skin of the roof of the mouth. 4. The ſoporal arteries. 5. The internal jugular. 6. The recurrent nerves between theſe: of all theſe parts the *larynx* is framed of the voice. The remote inſtruments of the voice are the breſt and lungs. The neerer, either prepare as the wind-pipe, or help as the ſinews and muſcles; or keep it as the throat or mouth, or immediatly from the voice, and that is done by the *glottis*; for the air being forcibly blown out of the lungs, it beating upon the chink ſhut reaſonably, procureth the voice.

Uvula.

The ſoporal Arteries.

The internal jugulars.

The recurrent nerves.

The inſtruments of the voyce.

The living creatures which make no voice have no neck, as fiſhes. The *uvula* cauſeth the pleaſant ſound of the voice: beſides it hath theſe uſes: 1. It ſtayeth the air a little, that it paſſe not cold and impetuouſly to the lungs. 2. Like a fanne

What living creatures have no voice.

fanne it putteth back duſt, and ſuch like bodies. 3. It hindreth the going up of liquid things to the noſe. If it be deficient, the voice becometh unpleaſant; and the lungs are cooled and made apt to receive defluxions, by the which they are ulcerate, and ſo *tabes* procured.

THE

THE THIRD BOOKE; OF THE HEAD.

CAP. I.

Of the common parts containing.

NOw followeth the third great venter of the body, called *Caput*, the head; becauſe the ſenſes and nerves take their beginning from thence. Its denomination

It is placed in the higheſt region moſt fit for the ſenſes, but chiefly for the eyes; for they ought Its ſeat.

to

to be placed there as in a watch-tower; and they having but soft sinews which could not endure a long passage, it was requisite that the brain should be at hand.

Its figure. Of figure it is sperical; yet somewhat flattish and long.

Its parts. The parts are of three sorts, for they are distinctive or expressive of the regions, or constitutive of the whole.

The parts distinctive are two, the hairy scalpe called *calva*, and that without hair called *facies*. The parts which expresse the regions, are four: 1. *Sinciput* or the fore-part reaching from the forehead to the coronall suture. 2. *Occiput* the noddle, or hinder part beginning at the suture *lamdoides*, and reaching to the first *vertebra* of the neck. 3. And 4. are called *tempora*, or the temples. The laterall parts between the eares and eyes.

The parts constitutive are either containing or contained. The containing are either common or proper.

proper. The common are *cuticula cutis*, and *membrana carnoſa*: the *cuticula* is thinner and ſofter; but the skin thicker then in any other part of the body, yet *porous* to give way to the nouriſhment of the hair. The *membrana carnoſa* in ſome it ſo cleaveth to the whole skin, that they can move all the skin at their pleaſure: fat was not requiſite, leſt it ſhould have hindered the diſcharging of the fuliginous vapours, and cauſed the heat to be too big.

CAP. II.

Of the Hair.

Its denomination

SEeing the skin is garniſhed with hair, I will diſcourſe briefly of it. A hair is a body, cold and dry, ſmall, thred-like, hard and flexible budding from the skin.

Its figure.

The hairs are not round, but four ſquare, as the ſtalks of ſome plants. This may be diſcerned

ned of a hair be put into the otpicke inſtrument, called *Jack in a Box.*

The parts of it

A hair hath three parts, one outward, which will admit cleaving: The middlemoſt flexible; and lowermoſt, which is called the root. It is white and beſet with a mucous ſubſtance, by the which it cleaveth to the skin.

The matter.

Hairs are produced, not of the fuliginous excrements of the brain, but of blood drawn by the roots and beſtowed upon the trunkes; As the feathers in fowls are produced; for if you plucke out any from very young ones, you ſhall manifeſtly ſee that blood doth both produce and feed the haire.

The ſubſtance

The ſubſtance of the hair is compact, ſolid and hard, apt to be cleft according to the length, and lateral flexible.

Their colour.

The colour of them is anſwerable to the naturall conſtitution of the party. They are moſt commonly ſtraight in thoſe which are borne

born in cold countries, but curled in those who inhibit hot climates.

They are short and thin in infants, longer and harder in men, but longest in women. Their bigness.

The hairs have four uses; for they serve for defence and beauty, and serve for the expulsion of fuliginous vapors, and show the temperature of the whole body and skin.

Cap. III.

Of the proper containing parts.

THe proper containing parts are foure; to wit, the muscles, the *pericranium*, the *cranium*, and the *Meninges*: Look for the muscles in the treatise of the muscles, and for the *cranium* in the doctrine of bones.

The *pericranium* is a membrane thinnish and white, immediately seated under the *membrana carnosa*. The *pericranium*.

It covereth the whole skull, except where the temporall muſcle lyeth upon the *cranium*. It being ſtretched over the temporall muſcle doth firmly binde it. And ſeeing it is moſt tender, it cauſeth horrible pain and inflammation, when the temporal muſcle is wounded.

No *Perioſtium*.

There is no *Perioſtium* beſides it, yet it is double; and being of a competent thickneſſe, it may be divided: as all membranes of the like nature.

Its connexion.

It is tyed to the *dura mater* by ſome nervous fibres, which paſſe within the skull, to ſtay firmly the *dura mater*, and ſo the brain from inordinate moving. And although in infants new borne theſe be ſtrongly united; yet in the proceſs of time they part, and become joyned onely by ſome fibrous tyes; from it to the brain by theſe inflammations may be communicated.

The *meninges*.

The Menninges follow, called by the *Arabians*, *matres*; as if all the membranes of the body were propagat

propagate from them: they are two in number, the *dura* and *pia mater*. The *dura mater* having in the upper superficies of it many veines, it representeth the leafe of a Figtree. It is a little distant from the skull, to give way to the motion of it. It hath two membranes; the upper towards the *cranium* is harder, rougher, and lesse sensible; becauſe it was to touch the hard skull.

Dura mater.

The lower is smooth, slippery and as it were, bedewed with water: It hath its beginning from the *basis* of the skull, unto the which it cleaveth firmly. It hath connexion with the skull and *dura mater* by nervous fibres. It hath a threefold use. 1. It wrappeth in the braine, and the sinewes proceeding from it, and is a defence unto them. 2. It divideth the braine from *cerebellum*. 3. It divideth the braine it selfe in two parts, the right and the left. This division, by reason of the figure of it, being broader in the hinder part; and by

Pia mater.

degrees growing narrower is called *falx*, or the *ſicle*.

Pia mater.

Tennis or thin *meninx*, or *pia mater*; It immediatly covereth not only the outmoſt parts of the braine, but the inner cavities in like manner. It receiveth from the *craſſa meninx* innumerable branches of veſſels, and beſtoweth them upon the braine.

It hath two uſes; Firſt, it keepeth the ſoft ſubſtance of the braine from running abroad. Secondly, it cloa theth the *cerebrum*, *cerebellum*, and the ſinewes. It is of an exquiſite ſenſe to obſerve ſuch things might hurt the braine.

CHAP. IV.

Of the nature of the Braine.

The colour of the brain

THE *Pia mater* being taken away, the braine offereth it ſelfe: Which in colour is white, that the animall ſpirits might be clear;

clear; which otherwiſe in a dark place of another colour would become leſſe clear and troubled.

The ſubſtance is thick, viſcous, ſoft, and white. It is not a glandule, for it is the ſeat of the animall ſpirits; but glandules are appointed to receive excrementitious humours, & it is more curiouſly framed then any glandule, neither is it of a marrowy ſubſtance; for marrow ſwimmeth in water, but this ſinketh. Beſides, the marrow nouriſheth the bones; but the brain nouriſheth no part. The ſubſtance of it differeth from all other parts of the body; as the ſtones do. Its ſubſtance.

The ſubſtance of it doubtleſſe, is a *parenchyma*, a ſubſtance oft uſed about the beginning of the nerves; as that of the heart and liver are. Its bigneſſe.

A man of all other living creatures hath the biggeſt brain; for it weigheth four or five *lib.* in ſome; and is as big again as an Oxes brain: for by reaſon of the

multitude of the animal function, plenty of ſpirits is required, which cannot be procured but by great ſtore of blood which cannot be contained within a narrow place.

The figure of the outer moſt circumference.

The outer circumference is full of windings, as the guts are; that the veſſels being in theſe, as furrows, might ſafely be carrried throughout the ſubſtance of the brain to nouriſh it.

Cap. V.

Of the upper region of the Brain.

THe brain hath three parts, *cerebrum*, that which properly is called the brain: the *cerebellum*, the little brain: and that part of the beginning of the *ſpinalis medulla*, which is within the skull.

Its difference from *cerebellum*.

The brain differeth from the *cerebellum*, firſt, in ſubſtance; for it

it is ſofter; ſecondly, in colour, for it is whiter; thirdly, in bigneſſe, for it is three times as big; fourthly, in cavities, becauſe it hath many.

The brain hath three regions; the upper which is varicous; the lowermoſt which is called *baſis*; and the middlemoſt. The upper part is divided into two parts, by the ſicle-like proceſſe; to wit, the right and left. In it there is a twofold ſubſtance; for the upper part of it is ſofter, and of an aſh-colour.

If you take away the three inches broad of this ſubſtance, then the *corpus calloſum* will appear; which is nothing elſe but the whiteſt and moſt ſolid ſubſtance of the brain. *Corpus calloſum.*

About the bottome of this diviſion of the brain, there appeareth a white ſubſtance, if you bring the ſides gently together with your finger; which is called *ſeptum lucidum.* It is looſe and wrinkled; but if it be ſpred abroad, it *Septum lucidum*

appeareth clear. It cleaveth above to the *corpus calloſum*, but below to the *fornix*. Some will have it to be a reduplication of the *pia mater*; others a portion of the brain. Under the *corpus calloſum* the *fornix*, or vault is ſeated of the like ſubſtance. In the upper part it is arched; but in the lower part *convex*, in figure it is triangular. It holdeth up the weight of this upper region from bearing down the ſubjacent part.

Fornix.

CAP. VI.

Of the middle region of the brain

UNder the *teſtudo*, firſt, the ventricles are ſeated, called *ſinus*. They are accompted four in number, whereof two are anterior, to wit, the right and left; they are ſevered by *ſeptum lucidum*. In the inner part they are covered with a membrane of an exquiſite feeling,

Their number. The anterior.

feeling, having its beginning from the *infundibulum* ascending. Between these *sinus* and the *fornix* there are two textures of vessels, one on each side, framed of the complication of small veins, tyed together by a thin membrane. They are called *plexus choriofromes*: Because they are like to the membrane wherewith the child in the wombe is wrapped, called *Chorion*.

Plexus choroides.

The third ventricle is nothing else, but the meeting of the former two, towards the hinder part. In it there are two passages: the first in the fore-part, which marcheth streight-waies down to the *infundibulum*. The second passeth under the *testes* and *nates* to the fourth ventricle. About this there is a chinke called *vulva*.

The posterior.

The *infundibulum*, or funnell, is a certaine cavity under the third ventricle framed of the *pia mater*, which becomming narrower representeth a funnell. It endeth in the *glandula pituitaria*, which receiveth

Infundibulum.

Glandula pituitaria

ceiveth the flegme falling from the ventricles of the braine. It is placed in the foure-square hollowneſſe of the wedge-like bone.

About this glandule, about the ſides of the aforeſaid cavity there is a membranous twiſting framed of innumerable twigs of arteries; which ſpring from the largeſt branch of the ſoporall artery, which paſſeth by a proper hole in the bones of the temples into the capacity of the *cranium*: It is called *rete mirabile*, repreſenting a net ſpread abroad.

Rete mirabile.

Here, of the pleaſant breathing of the blood, naturall ſleepe is cauſed; but if the arteries be too full, a deepe ſleepe is cauſed. if you blow up the ſoporall artery in the neck, they will be blown up alſo. Then the *infundibulum*, *glandula pituitaria* and *rete mirabile* are ſeated in the loweſt region, or baſis of the braine.

4. Ventricle.

The fourth ventricle is placed betweene the lower part of the *cerebellum* and the beginning of the

the *ſpinalis medulla*; and becauſe it being round endeth in a narrow point, it is called *calamus ſcriptorius*.

Calamus ſcriptorius

The chink is cauſed of the diviſion of the root of the *ſpinalis medulla*.

About the hindermoſt hole of the third ventricle which paſſeth to the fourth ventricle, certaine round bodies appear, ſmall portions of the brain, having their denomination from thoſe things which they reſemble. The firſt is *glandula pinealis*, or *penis*; becauſe it repreſenteth the Pine-Nut, or a Prick. It is ſeated in the beginning of that pipe by the which the third and fourth ventricle are united. Neer to this on both the ſides of the third ventricle four round bodies appear. The two upper are leſſer, and are called *teſtes*: the two great bearings out are called *nates*. The chink between the *nates* is called *anus*. The uſe of theſe ventricles is to carry ſafely the venal blood; for it

Penis.

Teſtes.
Nates.
Anus.

The uſe of the ventricles.

was not safe for the veines to be carried through the soft substance of the brain; left the veines being compressed by the weight of it, the passage of the blood should have been hindered.

Nature hath placed the ventricles aloft, because the blood being heavy is apt to passe down of it self. From the third ventricle innumerable veines passe by the windings of the brain to the inner substance of it. In these ventricles onely the venal blood is contained, carried thither by the internall jugulars, which end at the beginning of the lateral ventricles.

Cap. VII.

Of the Cerebellum.

Its seat. The second part of the braine is called *Cerebellum*, or the little braine. It is seated in the hinder part of the head or skull, unto

unto the which it cleaveth by the two membranes wherewith it is wrapped. It differeth from the braine in ſundry points. Firſt, in ſubſtance; for it is harder. Secondly, in bigneſſe; for it is ſcarce ſo big as the third part of the brains. Thirdly, in figure; for it is more flat than round. Fourthly, in cavities; for within it is not hollow. Fiftly, in colour, for it tendeth to a yellowiſh gray colour.

How it differeth from the braine.

It is framed of foure parts, whereof two are laterall, the right and the left: theſe are ſphericall: two are in the middle; to wit, the foremoſt and hindermoſt. Theſe are round.

Its frame *Proceſſus vermiformes.*

They are framed of ſundry orbicular portions; and becauſe they are like unto the wormes which are in hollow timber, they are called *proceſſus vermiformes*, wormlike *proceſſus.*

The one is in the fore-part of the fourth ventricle; the other in the hinder part.

Their

Their use.

Their use is to hinder the beginning of the cavity of the *spinalis medulla*, by the *cerebellum*.

CHAP. VIII.

Of the Spinalis medulla

Its name.

NOw followeth the third part of the braine, called *spinalis*, or *dorsalis medulla*.

Its substance.

The substance of it is not double, as it is in the braine, but uniforme, white, and compact; as it groweth in length it becommeth more and more hard.

Its parts.

It hath two parts; *viz.* that which is contained within the braine, and that which is kept within the *vertebræ* of the backebone. That which is within the skull is about foure inches in length. That which is without and beginneth at the great hole, reacheth to the *Coccyx*, growing smaller, and smaller, untill at last it end in many small twists, which resemble

reſemble a horſe taile.

It hath three membranes. The firſt is that which immediatly toucheth it. This ſpringeth from the *dura mater*, and paſſeth between both the parts of it. The veſſels which afford nouriſhment and life, paſſe alongſt this membrane. The ſecond covereth this, and ſpringeth from the *dura mater*. There is no diſtance between, as is ſeen in the braine, but one toucheth another. The third proceeding from the ligament which joyneth together the *vertebræ*, covereth both theſe. Its membranes.

It is divided all along, as it were by a long ſection, untill you come to the *vertebræ* of the loines: you may ſeparate theſe parts by boyling, for then they will fall aſunder. This diviſion is the cauſe that ſometimes one ſide only is paralytick. The *ſpinalis medulla* in figure is round. Its diviſion. Its figure

It ſpringeth both from the *cerebrum* and *cerebellum*. Two roots it hath from the fore-part of the braine, Its beginning.

braine, about the middle of the ventricles: theſe are in the forepart, and bigger, and are called *nates*. It hath two in like manner which are leſſer, and are called *teſtes*. They ſpring from the lower part of the *cerebellum*. Theſe marching towards the backe-part, meet together, and make the *ſpinalis medulla*.

The hinder trunks are clipped with a proceſſe; which by *Rawlins* is called *pons cerebelli*.

The common errour concerning the ventricles of the brain

The cavity between the *cerebellum*, and the *ſpinalis medulla* is accompted the fourth ventricle, as the vacuity between the *nates* and *teſtes* the third; but erroneouſly; for they are not within the ſubſtance of any part of the braine; but are of a neceſſity cauſed by reaſon of the parts aforenamed: So that in truth there are but two ventricles, or rather one parted by the *ſeptum lucidum*; yet for doctrines ſake foure ventricles are ſet down.

CHAP.

CAP. IX.

Of the actions of the brain.

THe action of the brain is this: After that the ſpirits and blood are diſcharged into the *Sinus* of the *dura mater*, by the veins and arteries, to temper the heat of them, the brain is ordained (ſeeing it is colder then the heart) that the animal functions, which are feeeling and moving may be the more readily executed.

Whether the animall ſpirits differ in ſubſtance from the vitall.

Wherefore the animal ſpirits ſeem not to differ from the vital ſpirits in ſubſtance, but in qualities; to wit, the temperament and attenuation; for they muſt be more temperate, becauſe heat doth both taint the reaſon (as we may ſee in drunkenneſſe and raving) and hindereth or perverteth the motion.

Why they ought to be temperate.

The ſpirits ought alſo to be more ſubtil; becauſe they are to paſſe, like a thunder, through the bodies

And ſubtill.

of

of the nerves. So as the vital ſpirits are carried to the parts of the body by the arteries, ſo the animal are carried by the nerves.

The place of the reaſonable Soul.

The animal ſpirits for this cauſe alſo ought to be ſubtil, becauſe the reaſonable ſoul is reſident in the brain which doth contemplate things immaterial, as Angels and it ſelfe.

Cap. X.

Of the ſinews proceeding from the brain, and firſt of the firſt pair.

Eight pair of ſinews proceed from the brain.

SO much then of the ſubſtance of the brain; It follows then that we ſhew the ſinews which proceed from it; of them there are eight pair comprehended in theſe verſes:

Optica prima; oculos movet altera; tertia guſtat:
Quarta, & quinta audit; vaga ſexta; at ſeptum linguæ eſt;
Octava olfactum regit, aere naribus hauſto.

The

The first paire, the *optici* or *visorii nervi* make; these bestow upon the eyes the faculty of seeing. They spring from the beginning of the trunkes of the *spinalis medullæ* in the nowle. They march on from thence drawing neerer one to another, until they meet at the cell of *Os sphænoides*; where they are united, not by simple touching, or intersection, but by confusion of their inner soft substance. These of all the rest are biggest and thickest, but softest. In their beginnings they are softest, but become harder, that they may passe the more securely so long a way.

The first pair.

These are hollow untill they be united, then the hollownesse cannot be discerned. This hollownesse may be shewed in a large beast newly killed, and in a cleare light. After their unition they are separate, and each of them, passing through the first hole of *os cuneiforme*, obliquely are inserted into the center of the eye.

The hollowness of the optick nerves.

Their insertion

These

Their Membranes, and marrowy substance. The use of these nerves.

These nerves have two membranes, and the inner soft marrowy substance. The membranes spring from meninges. The inner substance from the body of the braine.

These nerves cannot be divided into many twists, as other nerves are, but frame the tunicles of the eye; for the *cornea* doth proceed from the thick membrane, the *uvea* from the thin membrane, and the *retina* from the marrowy substance.

CHAP. XI.

Of the second and third Pair.

The second pair. Its beginning. Why both the eyes are directed to the same object.

THE second pair is termed *motorium oculorum*, because it moveth some muscles of the eyes. It hath its beginning about the innermost part of the beginning of the *spinalis medulla*.

These sinewes are so united where they spring out, that they make

make a common corner, which is the cauſe that both the eyes turne to the ſame parts.

Its ſubſtance.

It is ſmaller and harder then the former, and commeth out of the skul by the ſecond hole of *os cuneiforme*, which is long; and ſo entereth into the orbick of the eye.

Its ſprigs.

It hath ſundry ſprigs: the firſt mounting above the optick, it is beſtowed upon the attollent muſcle, and the eye-lid. The ſecond eaſie to be ſeen is beſtowed upon the adducent muſcles by ſundry ſmall twigs. The third by many *fibres* is inſerted into the depriment muſcle. The fourth is inſerted into the leſſer oblique muſcle about the outer corner. So that this pair only moveth four muſcles.

The third pair Its beginning, marching, and inſertion.

The third pair proceedeth from the lower part of the root of the *ſpinalis medulla*, in the beginning, being very ſmall; from thence it marcheth directly forward under the *baſis* of the brain, accompanying

panying the second pair, with the which it passeth through the second hole of the wedg-like bone, and entereth into the orbit of the eye. Then it is divided into four branches: the first bestoweth a branch upon the greater oblique muscle, which hath the *trochlea*: Then passing through the hole of *os frontis* above the orbit, it is bestowed upon the muscle of the eye-brow and the skin. The second marcheth downwards, and passing through the hole of the upper jaw-bone, which is under the orbit, is bestowed upon the muscles opening the upper lip and nostrils, as also the gums of the incisory teeth of the lower gum. The third passing by the hole of the second bone of the upper jaw which is under the caruncle of the great corner, is bestowed upon the inner membrane of the nose. This being very sensible causeth sneesing if any sharpe thing toucheth it. The fourth cometh out of the fourth hole of *os sphæ-*

Its branches.

The cause of sneezing.

noides

noides, which is the chink neer to the outward corner of the eye, and goeth to the inward part of the temporal muſcle. This beſtoweth the faculty of moving to the forenamed muſcle.

CAP. XII.

Of the fourth and fifth pair.

THE fourth pair ſpringing neer the place of the former, paſſeth through the ſixth hole of the wedge-like bone; and paſſing downward, it is divided into three branches; the firſt being twiſted, it is united into two twigs of *nervus auditorius*, and is beſtowed upon the muſcles of the cheeks and lower jaw. The ſecond is inſerted into the gums of the grinders of the upper jaw. The third entereth into the hollowneſſe of the lower jaw, and beſtoweth a twig to the roots of all the teeth. It endeth in the skin of the

The fourth pair.

Its branches.

Its ending.

the lower lip, and the membrane of the tongue neer the root. Ordinary Anatomists make but one pair of these two last, and set it down their third; but these two are united neither in their beginning nor insertion.

The fifth pair. Its beginning.

The fifth pair proceedeth from that place where a portion of *cerebellum* is united to the brain, lengthned by two nerves, whereof the one is softer, the other harder. These passe out of the membrane together; and by the hole of *os petrosum* enter into the wreathed hollowness of the ear.

Its twigs. Why they that are born deaf prove dumb.

The harder sendeth twigs to the throat, nostrils, and a twig to the tongue, by reason of this twig they that are born deaf prove also dumb.

The softer nerve, when it is come to the first cavity of the ear, it covereth it like a membrane; and truly may be called *nervus auditorius*, seeing it doth afford the spirits to the hearing.

CAP.

CHAP. XIII.

Of three other pairs.

THE ſixth paire is called *vagum*, becauſe it beſtoweth branches upon ſundry parts; and amongſt the reſt, to all parts of the belly which require feeling; for theſe being ſoft parts did not require hard ſinewes from the *ſpinalis medulla*. The ſixth pair. Its inſertion.

This ariſeth from the hinder and lower part of that place, from whence the former ſprung, by many ſmall twigs. Theſe make up two diſtinct nerves, which are covered with one membrane borrowed from the *dura mater*. So joyned, they paſſe through the ſecond and third hole of the nowle, by the which the leſſer branch of the ſoporall artery, and the greater of the jugular enter into the skull. Its beginning.

The leſſer of theſe branches is ſeated more forward, and when it is come Its branches.

come out of the skull, it is ſpent upon the muſcles of the throat & tongue, and the parts contained within the mouth. The greater is ſeated more backwards. This before it enter into the breſt; above the throat, it is divided into two branches; to wit, the Exterior, which is leſſer, and the Interior, which is greater.

Their current nerves.

From the exterior thoſe nerves doe ſpring, which are called *recurrentes*, or *reverſivi*, becauſe they deſcend and aſcend againe; and *vocales*, becauſe they being cut, hinder the voice.

Of theſe the right is winded about the axillar artery, as about a pulley. The left is wound about the *aorta* deſcending; afterwards mounting up, they are inſerted into the beginning of the muſcles of the larynx, which are in the lower part. This exterior is beſtowed upon the parts of the middle cavity. The Interior branch is beſtowed upon the parts of the abdomen. The right ſprig ſerving for

for these in the right side, and the left serving those in the left.

The seventh pair, which affordeth moving and feeling to the tongue, is hardest of all. The seventh Pair.

It hath its beginning where the *cerebellum* endeth, and *spinalis medulla* beginneth. Its beginning.

In its beginning it hath divers sprigs, which afterward are united & passe thorough the fourth and fifth holes of the nowle; which are placed between the great hole, by the which the *spinalis medulla* passeth; and that out of which the sixth pair issueth. As soon as it is come out, it is united to the sixth pair by a membrane. When it is come to the root of the tongue, it bestoweth most branches upon the muscles of the tongue, but fewest upon those of the *larynx*. Its frame

The eighth pair may be called *Olfactorium*, because it serveth for smelling. They arise at the hinder sides of the braine, which are above the holes of hearing. They are sharp in their beginning, and The eighth pair.

ſeparate. They end in the *proceſſus mammillares*, or *papillares*. In number they are two, white, ſoft, broad, long. In man they are but ſmall; but in beaſts of exquiſite ſmelling (as Hounds) large.

CHAP. XIV.

Of the nerves of the ſpinalis medulla; and firſt of the nerves of the Neck.

What it is.

OUt of the *ſpinalis medulla*, which is nothing elſe but the production of the *cerebrum* and *cerebellum*, by the *vertebræ* of the back do ſpring all the ſinews which move all the other parts of the body.

Its membranes.

The Nerves which ſpring from it.

The *ſpinalis medulla* hath three membranes, two as the brains, one harder, the other ſofter, and the third membranous and ſtrong, which *Galen* took to be the ligament of the *vertebræ*. From it do ſpring thirty pairs of ſinews; ſeven of the neck

neck, twelve of the breſt, five of the loynes and ſeven from the holes of *os ſacrum*.

The firſt pair of the fore-part commeth out between the nowle-bone and the firſt *vertebra* of the neck, and is beſtowed upon the muſcles which bend the neck which lie under the *æſophagus*. In the hinder part it commeth out of the hole, which is common to the nowle-bone and the firſt *vertebra* of the neck. The firſt pair.

It hath two twigs: The ſmaller is beſtowed upon thoſe which ſtretch out the neck. The bigger is inſerted into the beginning of the muſcle which lifteth up the ſhoulder-blade. Its twigs.

The ſecond pair in the fore-part, where it is ſmalleſt, it commeth out between the ſecond and third *vertebra*, and is beſtowed upon the skin of the face. In the hinder part it commeth out at the ſides of the proceſſe of the ſecond *vertebra*, but preſently it is parted into two twigs. The thicker is The ſecond pair.

beſtowed upon the whole skin of the head even to the crowne. The ſmaller is beſtowed upon greater, ſtraight, and the lower oblique muſcles which ſtretch out the head.

The third pair.

The third pair commeth out of the laterall hole, which is between the ſecond and third *vertebra*, and immediately is divided into two branches; whereof that which is in the fore-part, hath foure twigs: the firſt commeth to the long muſcle; The ſecond is beſtowed upon the muſcles which lie under the *œſophagus*; the third goeth to the skin of the back-part of the head. The fourth is beſtowed upon the tranſverſe muſcles of the neck, and the muſcle which lifteth up the ſhoulder-blade; The hindermoſt branch is beſtowed upon the ſecond pair which heaveth up the breſt.

The fourth pair.

The fourth paire commeth out of the hole common to the third and fourth *vertebra*, and hath two branches: The foremoſt hath three

three twigs. The first is bestowed upon those which bend the neck. The second is bestowed upon the transverse muscle of the neck, and the *cucularis* of the shoulder blade. The third goeth to the sinewy part of the midriffe. The hindermost branch goeth to the back-bone under the muscles of that part, upon which it bestoweth twigs.

The fifth pair marcheth out between the fourth *vertebra*; and hath two branches. The foremost hath four sprigs; the first goeth to those that bend the neck: the second goeth to make *nervus phrenicus*: the third to the *deltoides*: the fourth goeth to the *deltoides*, and to the *Coracohyoideus*. The hindermost branch goeth to the *spina*, and is bestowed upon the muscles there. The fifth pair.

The sixth paire commeth out under the sixth *vertebra*, and hath, as the rest, two branches: The foremost sendeth first one sprig to make *nervus phrenicus*: then it goeth to the arme: The second Thesixth pair.

branch goeth to the muſcles behinde which ſtretch out the neck and head.

The ſeventh pair.

The ſeventh pair commeth out of the hole common to the ſixth and ſeventh *vertebra*. The foremoſt and largeſt branch is carried to the arme. The hindermoſt and ſmalleſt is beſtowed upon the muſcles of the neck, and quadrat muſcle which pulleth down the cheek.

Cap. XV.

Of the nerves of the vertebræ of the Breſt.

The firſt pair.

FRom the marrow of the *vertebræ* of the breſt, twelve paires doe ſpring. In all of them, the foremoſt branch is biggeſt; but the hindermoſt, which is beſtowed upon the muſcles ſeated in the back, ſmalleſt.

The firſt, ſpringeth out of the hole which is common to the ſeventh

seventh *vertebra* of the neck, and the first of the breſt. The foremoſt branch marcheth upwards towards the *ſternum*, and beſtoweth a twig of *muſculus ſubclavius*, and thoſe which ariſe from the *ſternum*; and that which from the hollowneſſe of the ſhoulder-blade. The hindermoſt branch, lurking under the muſcles which cleave to the *vertebræ*, is beſtowed upon the muſcles of the neck, head and ſhoulder-blade.

The ſecond pair.

The ſecond iſſuing out of the place between the firſt and ſecond *vertebra* of the breſt, paſſeth to the arms, and produceth the firſt intercoſtal nerve, from whence twigs paſſe to the muſcles ſeated upon the breſt; both the foremoſt and hindermoſt branch have the ſame diſtribution.

The reſt of the pairs.

The reſt of the ten paires come out of the lateral holes of the *vertebræ*, and immediatly are divided in two branches; whereof the foremoſt being larger, make up the intercoſtal nerves; and being

joyned with the intercoſtall veins and arteries, and received into the groop of the lower part of each rib. The hindermoſt march towards the back-bone, amongſt the muſcles which cleave to the *vertebræ*, and ſerve for the ſtretching out of the breſt.

CHAP. XVI.

Of the ſinews of the marrow of the vertebræ of the loyns.

The firſt pair.

ALthough there be but four laterall holes in the *vertebræ* of the loynes; yet there are five pairs of ſinews. The greater foremoſt go to the muſcles of the belly. The hindermoſt goe to thoſe which reſt upon the *vertebræ*. The foremoſt are tyed together, the firſt with the ſecond, the ſecond with the third, the third with the fourth, and the fourth with the fifth.

The firſt commeth out of the lateral

laterall hole between the laſt *vertebra* of the breſt, and the firſt of the loynes: the foremoſt branch is beſtowed upon the fleſhy part of the midriffe aud the muſcle *pſoa*. It ſendeth alſo a twig by the *arteria præparans* to the ſtone; the hindermoſt is beſtowed upon the *muſculus longiſſimus* and *ſacrolumbus*.

2. The ſecond commeth out between the firſt and ſecond *vertebra* of the loynes. The foremoſt branch is beſtowed upon the *muſculus faſcialis* and the skin of the thigh. The hindermoſt is beſtowed upon the *muſculi glutæi*, and the membranous muſcle which ſtretcheth out the leg.

3. The third marcheth out between the ſecond and third *vertebra*. The formoſt ſendeth one twig to the knee and ſain thereof, and another which doth accompany the *ſaphena*. The hindermoſt turneth back, and is beſtowed upon the muſcles which reſt upon the loynes.

4. The fourth being the largeſt of

the muſcles of the loynes marching under the *os puhis*, doth accompany the veine and artery, which paſſe to the leg.

The fifth commeth out between the fourth and fifth *vertebra*, and is beſtowed npon the *obturatores muſculi*, and the muſcles of the pricke. The hindermoſt is beſtowed upon the muſcles and skin which are above the *vertebræ*.

CAP. XVII.

Of the nerves which come from the marrow of os ſacrum.

The firſt pair.

FRom the marrow of the *os ſacrum* ſix paires of ſinews ſpring.

The firſt iſſueth out between the laſt *vertebra* of the loynes, and the firſt of *os ſacrum*. The foremoſt branch of it is beſtowed upon the muſcles of the belly, and the ſecond which bendeth the thigh. The hindermoſt is beſtowed upon

upon the skin of the buttocks, and the greatest *glutæus*.

Of the other five pair.

The other five pairs on each side have two pairs, whereof the first three go to the legs. The second under these are bestowed upon the muscles of the bladder and fundament, to the neck of the matrix in women, and to the prick in men. The last are spent upon the muscles of *os ilium* and *sacrum* towards the back part, which are *longissimus*, *sacrolumbus*, *sacer*, and the *glutæi*.

CHAP. XVIII.

Sheweth how the brain is to be dissected.

THe brain is to be divided in three parts; to wit, the uppermost, the middlemost, and lowermost part.

In the uppermost, these parts are to be seen; thew indings, *falx*, and *corpus callosum*.

In the midlemoſt under the *fornix*, behold the ventricles, the *plexus choroides*, and *cerebellum*.

In the lowermoſt you ſhall finde the *infundibulum*, the glandules under it, *proceſſus mammillares*, eight paire of ſinews, and the roots of the *ſpinalis medulla*.

CHAP. XIX.

Of the outward parts of the eye.

WEE have ſpoken of that part which is decked with hair: Now we are to ſpeake of that part which is not altogether garniſhed with hair. In Latin it is called *facies*, in Engliſh, Face, becauſe it cauſeth every one to be diſcerned who he is.

Of the face.

The parts of it are either common or proper: The common are *cuticula*, *cutis*, *adeps*: it hath no *membrana carnoſa*, for it endeth in the chin, and the fat is onely in the places between the muſcles. The

The parts of it. The common

parts

parts proper are either containing or contained. The parts containing are the muſcles and bones, which are ſet down in their proper places. The parts contained are the inſtruments of the four Senſes, to wit, the eye, the ear, the noſe, and mouth. First, then of the eye, partly becauſe without ſight the life is tedious; partly becauſe the object of it is moſt ſubtil. They are in number two; First to look aſide. Secondly, to ſee by one if the other be loſt. Thirdly, to ſee more diſtinctly and clearly.

The proper.

Why the eye is firſt to be handled.

Why two.

In figure they are round: firſt, becauſe this figure is moſt capable of the multitude and bigneſs of the objects, and fitteſt for quick motion. They are ſeated high, the better to eſſay, and to govern motion which is foreward.

Their figure.

Their ſituation.

The parts of the eye are either externall or internal. The external are in number four. First, the eye-brow, the ſeat of diſdain and pride. It is framed of the skin, muſcles, fat, and hair. The skin is thick

Its parts

The externall.

The eyebrow

thick and hard to hinder the immoderate growing of hair. It is oblique the better to turn away those things which might fall into the eye. Secondly, the eye-lid; in man the uppermost is biggest, and moveth; but in birds the lowermost is biggest, and moveth.

The motion of the eye-lids.

The hairs called *cilia* in the upper lid turne upwards, but in the lower downward, that they should not offend the eye and sight. They repel small bodies from entring into the eye.

The hairs of the eye-lids.

it is framed of the skin; the musculous flesh, and a grisly welt, which keepeth the *cilia* from growing. Thirdly, the corners, the greater is toward the nose, the lesser towards the temples. Fourthly, *caruncula lachrymalis*, the glandule in the greater corner, seated before the hole which passeth into the nose. In it are the holes by the which the tears issue. *In* it is seated the *fistula* of the eye.

The frame of the eye-lid.

The corners.

The glandule.

CHAP.

Cap. XX.

Of the tunicles of the eye.

THe inner parts are in number five; the firſt is the fat, which firſt defendeth the eye from cold: ſecondly, keepeth it from the hardneſſe of the bone: Thirdly, moiſteneth the eye: Fourthly, filleth the diſtance between them. Secondly, the ſixe muſcles, which are ſet down in their proper place. Thirdly, the tunicles, whereof the firſt is called *conjunctiva* and *adnata*; becauſe it cleaveth firmly to the eye, and keepeth it within the *orbita*, that it ſtart not out in violent motions. It covereth the halfe of the eye orbicularly, but it ſpringeth from the *pericranium*. The ſecond is *cornea*, becauſe it is like to the lantern horne in firmeneſſe and brightneſſe; it may be ſevered into many skins. In the fore-part it is thinner and brighter; but in the hinder-part thicker and

The uſe of the fat

The muſcles.

The tunicles.

and darker. It is thin that the *visibiles ſpecies* may the more readily be carried to the chryſtallin humour. It is ſmooth alſo: for if it were wrinckled, it would have hindered the ſight it ſpringeth from the *dura mater*.

3. The third is *uvea*, becauſe it is like the husk of the black grape, for in colour it is not unlike, and ſmooth without, and rough within. It is of ſundry colours, the better to apprehend colours. The inner ſide is blacke, that a weak light might the better be ſeen by the chryſtallin; for light in a darke place ſhineth the more brightly. It ſpringeth from the *pia mater*.

The *Pupilla*. In the middle it is perforate, which maketh the *pupilla*: this is nothing elſe but the hole of *uvea*. The circle about the *pupilla* may be ſeparated from the *uvea* in an Oxes eye boyled.

4. The cryſtallin. Fourthly, *Chryſtallina*; it is a membrane thin and clear, compaſſing the chryſtalline humour thinner before than behinde. Fifthly, *vitrea*; it is very thin, white, and ſmooth: If it be

be cut, the vitreous humour iſſueth out.

CHAP. XXI.

Of the humours of the Eye.

THe humours make up the fourth internall part. They are in number three; *aqueus*, *criſtallinus*, *vitreus*. The firſt is the wateriſh humour, ſo called, becauſe it runneth as water; it hath no tunicle, it not onely filleth the cavity between the *cornea* and the chryſtallin humour; but compaſſeth alſo the vitreous humour; for if you cut the eye behind, it will as well run out there as before. The wateriſh humour is kept together by ſome ſmall thred-like ſubſtances. They are under the circle of the *uvea*, and by reaſon of them the cataract groweth. This texture of filaments is by ſome called *tunica ciliaris*, ſo called, becauſe they are black and like to the

1. Where the cataract groweth.

the eye-brows, but improperly.

2. The ſecond is the Cryſtallin humor, ſo called, becauſe it reſembles a Cryſtall or Ice; it is of a compact wateriſh ſubſtance. It is plain before, that there might be a competent ſpace for receiving of the viſible reſemblances; for the which uſe a round figure was not fit; yet it is plain behind, where it ſticketh in the humour vitreous. It cauſeth every thing to ſeem bigger. It is placed not in the middle of the eye, but neer to the *pupilla*.

3. The third humour is the *vitreous* or glaſs-like humour; for it is like to moulten glaſs. It is placed behind, that if any thing ſhould eſcape the Cryſtallin humour, it might be ſtayed there, and not returne to the *uvea*. It receiveth the Cryſtallin humour as a ſoft pillow, wherefore it is ſofter then it. It is more copious then the other two; it is ſtayed by ſome filaments; theſe being by inciſion ſeparated, the glaſs-like humour runneth as water. The fifth internal

ternall part the veſſels make. The externall veines proceed from the externall jugulars; the internall from the *plexus coroides*. The externall arteries ſpring from the externall ſoporalls; but the internall from the *rete mirabile*. There be two nerves appointed for each eye, one for motion called *motorius*; the other for ſight called *viſorius*, this is ſofter. The fifth internall part.

CAP. XXII.

Of the Auricula.

NOW followeth the inſtrument of hearing, the eare. The eares are two; that the one failing, yet we might heare with the other. They are placed in the head, becauſe ſounds aſcend, and becauſe we have alwayes need of this.

The parts of the ear are either outward or inward. The outward is called *auricula*; of it ſome parts are The parts of it.

are common, some proper. The common are, *cuticula cutis*, *membrana nervea*, *caro*, and fat in the lobe. The skin is thin; under it there is small store of flesh, which is tyed to the cartilage by a membrane. The lobe by reason of the flesh and fat, seemeth fleshy, and fatty. The proper parts of the *auricula* are the muscles, veines arteries sinews, and the cartilage. As concerning the muscles, they are set down in their proper treatise. The veines come from the externall jngulars; the arteries from the soporalls; the nerves from the second pair of the neck. The cartilage was fittest for this place. If a bone had been here, it had been troublesome, and easily broken: if flesh, it had been subject to contusion, and could not have repelled the sound. It is tyed to *os petrosum* by a strong ligament which riseth from the *pericranium* to stay it up.

Its uses.

The uses of the outward ear are these: first, it serveth for beauty. Secondly,

Secondly, to help the receiving of the ſounds the more readily: for firſt, it gathereth them being diſperſed in the aire. Secondly, it doth moderate them, that they come gently to the *tympanum*. The hair here hindereth the creeping of inſects.

CAP. XXIII.

Of the inward part of the ear.

THE inward eare is framed of four cavities, and their furniture. The firſt is *meatus auditorius*, which is alwayes open; it hath windings, leſt the air ſhould ſuddenly ruſh in upon the *tympanum*. It is oblique; to abate the vehemency of a ſound. It marcheth upwards, that if any thing ſhould goe into it, it might the more readily fall out. It endeth at the *tympanum*, and containeth the earewax, by the which the braine is purged, and inſects hindred from creeping

creeping in, entangling them as bird-lime. It endeth at the *tympanum*.

The drum.

This membrane is very dry, that it might give the better ſound. It is thin and clear, that the ſounds may be more readily ſent to the internall aire. It is ſtrong that it ſhould the better endure externall harmes. It hath a cord for ſtrength and ſtretching of it, even as the Military Drum hath. The ſecond cavity by *Veſalius* Is called *pelvis*, the tunel, by *Fallopius conchia*, the perwinkle from its figure.

Pelvis.

The uſe of the things contain'd in it.

The furniture of this cavity ſerves for three purpoſes, for motion, for tranſmiſſion of ſounds, and for the expurgation of the excrements; for motion, the three little bones, the ligament and muſcles doe ſerve. The little bones are in number three; the firſt is *malleolus*, the little hammer. It hath a thick and long head, cleaving to a narrow and ſmall neck. It hath a ſmooth cavity to be articulate with the anvil. It hath two pro-

The three little bones. 1.

ceſſes

ceſſes ſpringing from the neck; unto the upper, which is leſſer and crooked, the corde of the Drum cleaveth. The membrane reſteth upon the lower. The ſecond is *Incus*, the anvil, having a head and two feet. 2. The head is ſomewhat thick. In the top of it there is a ſmooth cavity which receiveth the knob of the hammer. The ſmalleſt and longeſt foot is tyed to the top of the ſtirrop; but the thickeſt, broadeſt and ſhorteſt reſteth upon the *os ſquamoſum* of the temples. The third is *ſtapes*, or the ſtirrop. 3. In figure triangular, in the middle hollow, to give way to the paſſing of the air to the *labyrinthus*. In the upper part of it is a very ſmall and round knob, upon the which the longeſt foot of the anvil reſteth the *baſis* is ſet to the oval hollowneſſe, and the membrane ſhutteth it.

The qualities of theſe bones.

Theſe bones have no *perioſtium*, for then they would be unfit to returne any ſound. Secondly, they have neither cartilage nor marrow

row, for they must be hard. Thirdly, in infants they are as perfect and as big as in men. Fourthly, they are placed up by a ligament, that being shaken by the internall air, moved by the external, the sharper sound may be caused.

Its uses.

These bones have these uses; First, they strengthen the *tympanum*; therefore the hammer with one of the feet of the anvil lean upon the Drum. Secondly, by shaking of the *tympanum*, they bring the better the sound to the auditory nerve. Thirdly, they further the receiving the diversity of sounds, as the teeth the distinction of words. Last of all, for motion the muscles are appointed: one is without the drum, above in *meatus auditorius*, whose tendon is inserted into the *tympanum*, against which the *malleolus* is inserted to draw it outward together with the hammer. The other is within the Drum in *os petrosum*, inserted by a double tendon in the hammer to draw it back.

The

The third cavity is called *labirynthus*, becauſe it hath ſundry windings. There are ſixe ſemicircles in this cavity. The end of theſe windings is to mitigate the ſound which was redoubled within the *concha*, as an eccho. The third cavity.

The fourth cavity is called *cochlea*, or a wilke, ſo called, from the figure; for it hath three, ſometimes foure wreathings: within there is a chinke, by the which the ſound paſſeth to the braine, and the bilious excrement falleth into the aire. The fourth cavity.

The hearing is thus cauſed, The aire paſſeth through the firſt cavity, and gently beateth upon the drum, which being ſhaken, toſſeth the three bones joyned to it. Then the kind of ſound is impreſſed into the inward aire, which having the quality of the ſound, and being circulate through the windings of the labyrinth to make it purer, is conveyed by the *cochlea*, and delivered to the auditory nerve that the animall ſpirit may How the hearing is cauſed

preſent it to the common ſenſe, the judge of all ſpecies.

Cap. XII.

Of the Noſe.

THE inſtrument of the third ſence, ſmelling, enſueth, to wit, the noſe: the parts of the noſe are either externall or internall. The externall parts are theſe, the skin, the muſcles, the veines, arteries, nerves, bones and cartilages. Firſt, the skin cleaveth ſo faſt to the muſcles and cartilages that it cannot be ſevered without renting. Secondly as for the muſcles, they are ſet down in the deſcription of muſcles. Thirdly, the veines come from the externall jugulars, as the arteries from the ſoporall. Fourthly, the ſinews come from the third paire, on each ſide one. Fifthly, the bones of the noſe are ſet downe in the doctrine of bones. Sixthly, the cartilages are

The externall parts.

1.

2.

3.

4.

5.

6.

are in number five; the two upper make up the half of the *Alæ*, the two under make up the other half; the fifth division the noſtrils: the cartilages are onely moved by the muſcles.

The inner part of the noſe, are theſe: Firſt the membrane which covereth the inſide of the noſe, which proceedeth from the *dura mater*, and paſſeth through the holes of the *ethmoides* bone. Secondly, the muſculous membrane, which draweth together the noſtrils. Thirdly, the hairs which diſperſe the air, and hinder the creeping in of inſects. Fourthly, the red fleſhy ſpongious ſubſtance, with which the holes of the *ethmoides* are filled up; from this the *polypus* ſpringeth. The length of a comely noſe is the third part of the length of the face. The upper part of the noſe which is bony, is called *dorſum naſi*, the ridge *ſpina*. The laterall parts, where the cartilages are, *alæ*, *pinnæ*; the tip of the noſe *globulus*, *orbiculus*, *pynula*. The fleſhy

The inner parts

The denomination of ſome parts.

part next to the upper lip, *columna*.

Its uſes. The uſes of the noſe are theſe; Firſt, by it the air is ſent to the brain, for the generetion of the animal ſpirits. Secondly, the lungs by it draw in air for the refreſhing of the heart, and the generation of the vitall ſpirits. Thirdly, ſmels by it are carried to *proceſſus mammillares*. Fourthly, by it the brain diſchargeth its excrements. Fifthly, it furthereth the ſpeech. Sixthly, it beautifieth the face. Seventhly, it parteth the eyes, that the one ſhould not ſee the other, which would have hindered the ſight. Eighthly, it is a defence to them alſo, and ſtayeth the viſible reſemblances. Ninthly, by fleering up, it expreſſeth anger, ſo that in the Hebrew tongue it ſignifieth anger.

CHAP.

CHAP. XXV.

Of the Lips.

NOw laſt of all followeth the mouth, wherein is contained the tongue the inſtrument of taſting. The uſe of it is fourfold; for it ſerveth for breathing, taking of food, ſpeaking and diſcharging of the excrements of the brains, lungs, and ſtomack.

The places of the mouth are either external or internal: The external are the lips: theſe are framed of a fungious ſubſtance, and the ends of the muſcles covered with the skin: They are in number two, the upper and the lower. Of the muſcles of the lips, ſufficient is ſpoken in the proper place. The lips within are covered with a mmbra ne common to the mouth and ſtomack; and fr om hence commeth the trembling of the lower lip before vomiting. The parts which touch one ano-

The externall parts of the mouth.

ther are red, by reason of the afflux of blood. The colour of these are diligently to be observed in diseases.

The uses of the Lips.

The uses of the lips are these: First, they serve for the conveniency of eating and drinking. Secondly, for the beautifying of the face, if they be well fashioned. Thirdly, for the containing of the spittle in the mouth, that it should not run out at unseasonable times. Fourthly, to keep the gums and teeth from external injuries. Fifthly, for framing of the speech. Sixthly, for kissing.

CHAP. XXVII.

Of the inner parts of the mouth.

THe inner parts of the mouth are these; The gums, the teeth, the *palatum*, or roof of the mouth, the almonds, the *uvula*, and tongue. The gums, they are

1. fleshy

fleshy substances, destitute of motion, appointed for the keeping of the teeth in their sockets. As for the teeth, look for them in the doctrine of bones. 2.

The roofe of the mouth is vaulted, that the air being repercussed, the voice may be the sharper. 3.

The skin there is wrinkled and rough, that the white hard membrane should the more firmly cleave to the bone, and keep the meat together while it is a chewinge. 4, 5.

Of the almonds, and *uvula* we have spoken in the discourse of the neck. The last of the inner parts is the tongue: In figure it is pyramidal: it is composed of flesh, muscles, ligaments, and the skin that covereth it. The skin that covereth it is of an exquisite sense, and proceedeth from the *dura mater*. The flesh is spongious, and such as is not in any parts of the body; that it might receive the qualities of sapors, and judge of them the better. From hence it commeth, that it doth imbibe the fumes and vapors of the humours- 6. The tongue. Its parts

Its motion.

predominant in the body which by its colour it doth declare. The tongue moveth forward, backward, to every ſide it is contracted, thruſt out, and doubled. Look for the muſcles appointed for theſe motions in their proper place. Although it ſeem but one continuall member, yet it is divided into two parts by a line going alongſt it. And in the palſey of one ſide of the body, one halfe of the tongue may be affected, the other remaining ſound. Of the ligaments, the lower which is called *frenum*, as in the prick, is moſt remarkable: By this part Nature ſheweth that moderation is to be obſerved in the uſe of theſe members. If this ligament be extended to the top of the tongue, it hindereth ſucking in children, ſo that they are ſaid to be tongue-tyed. The veines proceed from the externall jugulars under the tongue, they are called *ranulares*, from their colour. The arteries come from the ſoporalls. Sinews it hath from the third and ſeventh

Its divſion.

The cauſe of tongue-tying in children.

The veſſels.

seventh pair. The uses of the tongue, are these; First, it is the instrument of tasting: Secondly it uttereth the speech: Thirdly, it helpeth the chewing of meat, by tossing of it to and fro, and turning it down to the stomack. Fourthly, it serveth for licking, from whence in Latin, it is called *lingua á linguendo* from licking.

THE FOURTH

BOOKE.

A deſcription of the Veins, Arteries, and Sinews of the Limbs.

CHAP. I.

Of the veins of the Armes.

RAmus *ſubclavius*, or the branch of the *vena cava*, aſcending under the cannel-bone, when it is come to the arm-pit, it is called *axiliaris*; and it parteth it ſelf in two veins, the *cephalica*, and *baſilica*.

The

The *cephalicæ* in beasts doth wholy spring from the externall jugular; but in man it receiveth only a spring from the external jugular. Wherefore in diseases of the head it is not without cause opened. It passeth through the upper and outward parts of the arme, to the bending of the elbow, where it is divided into two branches; of the which one, joyning with a branch of the *basilica*, makes the *mediana*. Wherefore the slope branches, which usually are opened about the bending of the elbow, are onely branches of the *cephalica*, and *basilica*, which meeting, make the *mediana*. The other branch of the *cephalica* marching according to the length of the *radius*, reaching to the hand, through which it is spred; but chiefly that part whtch is between the ring-finger rnd the little finger.

There the *salvatella* is placed, which is to be opened in melancholy diseases. The *basilica* passeth through

through the inner and lower part of the arm, accompanied with the artery and nerves.

About its beginning it maketh the *thoracica*, which having three or four ſprigs, and paſſing under *ſerratus major*, and the ſubſcapular muſcle, it is tyed to the upper intercoſtall, and about the *ſpina dorſi* is inoſculate which the twigs of *vena ſine pari*. *Baſilica* about the bending of the elbow is divided into that which is called *ſubcutanea*, and that which is called *profunda*.

Profunda the deeper; is annexed to the artery about the bending of the elbow, not under. Then paſſing between the focils, it is carried to the hand by the outer part of the *ulna*.

The *ſubcutanea* or the ſhalloweſt branch neer to the bending of the arme being turned up to the outer part of the *ulna*, by the length of it, is it carried to the hand.

The *Mediana* paſſeth to the inſide

inside of the hand by the middle part of the *ulna*.

CAP. II.

Of the arteries of it.

RAmus *subclavius* so called, as that of the *vena cava*, when it is come to the arme-pits; it is called *axillaris*. It accompanieth the *basilica*: for there is no cephalical. Neer to the arme-holes, it yeldeth that artery, which is called *thoracica*, from thence being carried to the bending of the of the arm, it is parted into two branches, which passe to the inner side of the hand; for the outside of the hand hath neither muscles nor artery.

The one of these resting upon the *radius*, is that which is felt about the wrest.

The other marching by the *ulna* is with its fellow, spred through the hand.

CAP.

Cap. III.

Of the ſinews of the Arme.

OUT of the perforations of the foure lower *vertebræ* of the neck, and of the firſt two of the back ſixe ſinews ſpring, which by the muſcle called *ſcalenus*, are carried under the cannel-bone to the armpit, where they are twiſted together; from theſe the four uppermoſt, accompanying the *baſilica* and the artery under the *diltodes* muſcle, are ſcattered through the inner ſide of the arme. The fifth and ſixth, turning up under the *rotundus major*, are inſerted into the hindermoſt muſcles of the ſhoulder-blade. Four remaine, which paſſing along the arm are ſpred into the elbow and hand.

The firſt being carried under the inner ſide of the *biceps*, doth joyn it ſelfe which the *cephalica*.

The ſecond being undivided and thicker,

thicker, goeth down to the bending of the elbow, being covered with fat, and there is under the artery and the *basilica*; but about the wrist it is above the vein. About the wrist it is divided into ten branches; imparting to every finger two sprigs, which pass along the sides.

The third being entire also, is carried all along the elbow by the wrist to the little finger: where divided into four twigs, it is bestowed upon the outside of the hand.

The fourth being thickest of all, is carried from the artery and veins by the backside of the arm to the *radius*; where being joyned with the *Cephalica*, it endeth at the wrist.

CHAP. IV.

Of the veins of the Foot.

THE crural vein sendeth a branch to *musculus triceps*, called

called *Teſchia*, , and is divided into four branches: of the which two are in the inſide of the thigh, and ſo many in the outſide. The one of the externall is ſent to the fat of the thigh, the other paſſing according to the length of *muſculus ſuterius* to the ham; and from thence to the inner ankle, making the *ſaphena*. Of the inner branches the one lying high, is joyned with the crural artery, and paſſing through the outſide of the ham, is carried to the outer ankle: the other lying deeper, as it paſſeth, beſtoweth twigs to the adjacent parts, and about the ham, maketh the *poplitea*; from thence being carried between the focils by the chin of the inner ankle, it is beſtowed upon the ſoal of the foot, as the *ſaphena* was upon the outward parts. The veins hath valves within like to a half moon; without they are like knots; they are moſt commonly two together, one on each ſide, leaving ſome diſtance between, partly to ſtrengthen the

the coats of the veines, partly to rule the motion of the blood.

The arteries have no valves in their progreſſion, that the vital ſpirit may ſpeedily as the beams of the Sunne, paſſe to the furthermoſt parts.

CAP. V.

Of the arteries of the foot

ARteria cruralis, or the crurall artery, a little below the groyne, doth ſend two branches through the muſcle *triceps* to the *gloutii*, or muſcles of the buttocks. Afterward it ſendeth two to the forepart of the thigh; then undivided, it paſſeth to the ham, where it is divided into two branches, whereof the one aſſeth by the ſide of the outward part of *tibia* above the muſcle *peroneus*, and is beſtowed upon the upper part of the foot; the other entering into the *ſolæus*, and paſſing to the *pterna*, is diſperſed

perſed through the ſoal of the foot,
2. The *ſaphena* is not accompanied with with an artery, and the nerve is not very neer unto it, ſo that it may be ſafely opened.

CHAP. VI.

Of the nerves of the Foot.

FRom the three lowermoſt *vertebræ* of the loyns, two ſinewes ſpring in the forepart of the thigh,
3. ſevered firſt, and then being united, paſſe to the groyne. There it is divided into five branches, compaſſed with a membrane, which diſperſing themſelves on every ſide into the muſcles of the forepart of the thigh, even to the *rotula*, there being, cannot be diſcerned, unleſſe the muſcle *pſoæ* be rent; within the which they lye hid. Then beſides theſe, you ſhall ſee another ſmall nerve paſſing the ovall cavity of *os pubis*, to be ſpent upon the *triceps*. Through the back-part

back-part of the thigh, a great and thick nerve passeth framed of three, which spring out of the three upper holes of *os sacrum*, and being carried by the sinews of *os isihium*, thorough the inner and back muscles of the thigh, to the ham, there it is parted into two branches.

The one goeth down by the belly of the *tibia* unto the *pterna*, bestowing twigs as it goeth, passing by the chin of the inner ankle to the soal of the foot, it is severed into as many branches as there are toes. The other branch marching upon the *perone*, is carried to the instep of the foot by the outer ankle. By reason of this great nerve, they who are troubled with the *sciatica*, finde pain not onely about the joynt of the thigh, but in the leg also, and foot. About the beginning of this nerve, another issueth out of the third hole of the *os sacrum*, and being carried above the ridge of the *os sacrum*, it brancheth it self into the

muscles

muſcles of the buttocks, and thoſe which bend the *tibia*.

CHAP. VII.

Of the nerves of the ſpinalis medulla.

IF you invert the brain, you ſhall perceive foure roots of the *ſpinalis medulla*, two from *cerebrum*, and ſo many from *cerebellum*: theſe joyned together make it up. It is of the like ſubſtance with the brain; but beſides the two membranes, wherewith the *cerebrum* is compaſſed, this hath a third ſtrong, and nervous proceeding either from *os occipitis*, where it is joyned with the ſpondils, or from the ligaments of the *vertebræ*: this ſtrengtheneth the *ſpinalis medulla*, and keepeth it from tearing in violent motions. From the beginning to the end it groweth narrower and harder, ſo that when it is come to the end of *dorſum*, it endeth

endeth in ſmall threds like a horſe tail, that no danger ſhould be in that part where the whole *ſpina* is bended.

The nerves of the *ſpinalis medulla*, are framed of ſundry filaments twiſted together, and covereth with a thin membrane; and as they come out of the holes of the back-bone, nature doth compaſſe them with a thick and firm ſubſtance; which ſo firmly clip the *fibres* of the ſinews that they cannot be ſevered. Beſides the ſinew commeth not out of that hole, directly oppoſite to its beginning, but out of the lower.

And when it hath paſſed through this hole, it doth not enter preſently into the rib, which is next, but into the lower. Which when it hath touched, being divided, it turneth the leſſer twig towards the *ſpina*, and the greater towards the fore-part. Out of this *ſpinalis medulla* twenty eight pairs of ſinews ſpring, ſeven from the neck, twelve from the back, and five from

from the loines, and four from the *os ſacrum.*

The firſt conjugation of the neck, doth not ſpring from the ſides of the *ſpina*, as the reſt; but from the fore and hinder-part, and commeth out between the *occiput* and the firſt *vertebra.* The fore-branch is beſtowed upon the muſcles of the back ſide of the head, and the muſcles of the *vertebra* of the neck.

The ſecond Conjugation, by the hindermoſt branch turned up, aſcendeth to the skin of the head, the ears, and the muſcles; but by the foremoſt branch it is carried unto thoſe muſcles, which are common to the ſecond ſpondil, and the *occiput.*

The third Conjugation ſendeth its foremoſt branch to thoſe muſcles which bend the neck: but the hindermoſt to the muſcles which raiſe up the neck and head.

The fourth Conjugation ſendeth its leſſer and hindermoſt branch to the muſcles of the neck; but the

the formoſt and largeſt to the muſcle, which lift up the ſhoulder-blade and the arme.

The fifth conjugation with its leſſer twig turneth to the hindermoſt muſcles of the neck; and with the greater joyneth it ſelf with the twigs of the fourth pair.

The ſixth pair by the leſſer and hindermoſt branch paſſeth to the hindermoſt muſcles: but with the foremoſt and biggeſt to the arm and the *diaphragma*.

The ſeventh with the greater branch paſſeth to the arm, but with the leſſer to the hindermoſt muſcles.

As for the nerves of the back, each of them hath two branches, one leſſer, which is ſent to the muſcles of the back; and one greater, which is beſtowed upon the intercoſtall muſcles.

One thing is to be noted that the ſinews which proceed from the *vertebræ* of the ſhort ribs are bigger then thoſe which are communicate to the upper intercoſtal muſcles

muſcles. Thoſe about the middle of the rib are divided into two twigs; whereof the outermoſt is carried outward, but the innermoſt inwardly along the rib. Theſe nerves were to be biggeſt, becauſe they are diſtributed both to the muſcles of the belly, and to the parts contained in it.

As for the nerves of the loynes, each pair of theſe hath anterior and poſterior branches, which are ſpent partly upon the muſcles of the loynes, and *hypogaſtrium*; partly upon the legs. The *lumbares nervi*, or ſinews of the loynes, meet, and are mingled with the *coſtales*. Whereby it commeth to paſſe that the parts which are contained within the *peritonæum*, have their ſtrength from the *ſpinalis medulla*, as their ſenſe from the braine: for according to *Galen*, *cap.* 5. *lib.* 16. *de uſ. part.* the coſtal nerve is a ſprig of the ſixth conjugation.

As for the neves of *os ſacrum* the firſt pair hath two branches, as thoſe of the loynes; to wit, the anteri-

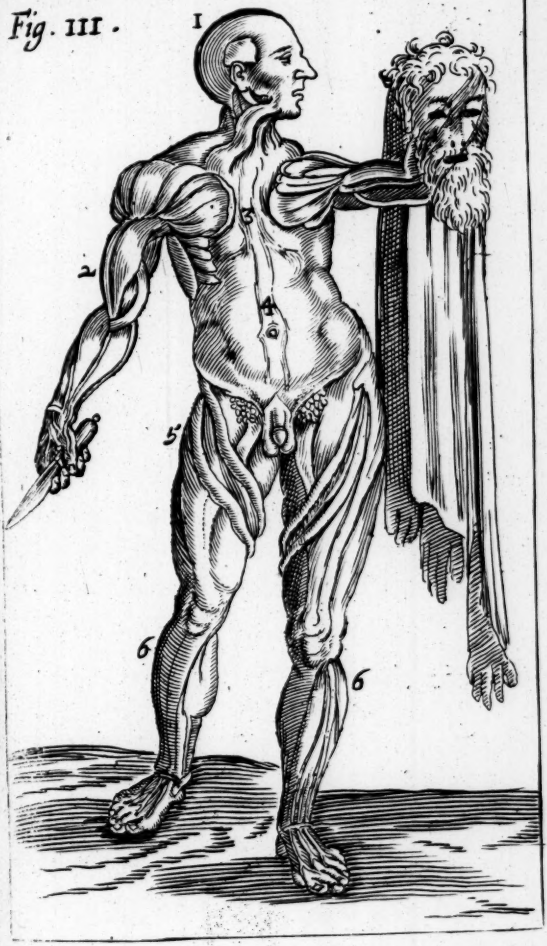
anterior and posterior; but the rest of the paires before they come out, are double on each side: and on each side one nerve marcheth forward and another backward. The uppermost three, which are anterior goe to the leg: The two lowermost passe to the muscles of the *anus* and bladder.

The explication of the Third Figure.

1. *The musculous skin of the Head.* 2. *The muscles of the Arme.* 3. *The muscles of the Brest.* 4. *The muscles of the Belly.* 5. *The muscles of the thigh.* 6. *The muscles of the Legs.*

This figure is to be placed before the first chapter of the Treatise of the muscles.

Fig. III.



THE FIFTH

BOOKE

Containing

A Treatiſe of all the Muſcles of the body.

CHAP. I.

The deſcription of a Muſcle.

A Muſcle is a diſſimilary part, framed of its proper membrane, a fibrous fleſh, a tendon, veins, arteries, and nerves, appointed by nature to be the inſtrument of free motion. The parts then are either common or proper. The common are three: The vein, the artery, and the nerve,

The deſcription of a muſcle.

The parts conſtitutive

Veins. Arteries. Nerves.

nerve. The proper ſo many; the fibrous fleſh, the membrane, and the tendon. The veins afford nouriſhment, the arteries life, and the nerves motion. Theſe ſpring either from the brain, or from the *ſpinalis medulla*. It is implanted either in the beginning, or about the middle of the muſcle. The nerve as ſoon as it hath entered into the ſubſtance of the muſcles, like unto a ſhrub, it is diſperſed into a number of twigs, which at the laſt end in it, and become inconſpicuous.

The fleſh

The fibrous fleſh is extended onely according to the ſtraight poſition of the *fibræ*, whereas the fleſh of the other parts have no certain poſition.

The fibres

The fibres of every muſcle are alwaies ſtraight: wherfore the muſcles of the belly have not their denomination from their fibres, for they are all ſtraight; but from poſition and ſituation: ſo that the muſcle called *maſſeter* is accounted double, ſeeing it hath two ſorts of fibres, one lying upon another.

The fibres. ſpring from the Nerves according to *Galen.*

Every muſcle

muſcle hath a proper membrane; It is ſo, more properly named then a coat: for veins and arteries are properly ſaid to have coats. The membrane doth either ſpring from the tendon, or is framed by nature in the very firſt conformation of the parts. The laſt proper part of the muſcle is the tendon. It is a ſimilary body, framed of the ſeed of a ſinewy-like ſubſtance, onely (for it hath a peculiar ſubſtance differing from a ſinew) white with a kind of brightneſſe, thick, hard, and ſmooth, extended according to the length of the muſcle. It is ten times bigger then a nerve: It beginning at the head of the muſcle, paſſeth through the belly of it, and endeth in the tail, as manifeſtly appeareth in the foot of a Cock. All muſcles which are appointed for the moving of bones, have tendons; but thoſe which move other parts, as the tongue, lips, bladder, and the *anus*, ſeldome have. It is ſaid to ſpring from the bone; this is to be underſtood by

The Membrane.

The tendon.

Which muſcles have tendons. How it ſprings from the bone.

reaſon of its inſertion, but not production. It is the principal part of the muſcle, and not the fibrous fleſh: firſt, becauſe it only hath ſtrength to lift up the bones: ſecondly, becauſe it onely is fit to contract it ſelf, whereas the looſe and ſoft fleſh is neither able to lift up the bones, nor to contract it ſelf: thirdly becauſe there is not ſuch a part in all the reſt of the body. It hath its motory faculty from the nerve by influence, as the load-ſtone draweth the iron, and the cramp-fiſh doth benumme the hand of the fiſherman by the pole. It is framed by nature of the ſeed in the firſt conformation, and not of the nerve and ligament mingled together: Firſt, becauſe a nerve being ſomewhat ſoft, wil not admit commixtion with the ligaments being hard. Secondly, becauſe the nerve is not carried to the tendon, but doth end into inconſpicuous threed. Thirdly, ligaments are inſenſible, but tendons are of exquiſite ſenſe; as appear-

It is the principal part of a muſcle.

From whence it hath its motive faculty.

Its materiall cauſe.

appeareth by the great pain which enſueth if they be pricked. Fourthly, becauſe the ligaments of the bones have the compoſition of membranes: for they are made of ſtraight and tranſverſe fibres, as a web; whereas the tendons have onely ſtraight fibres. The tendon beginneth at the belly of the muſcles, for there it is bigger and ſtronger than in the head or taile. The tendones are ſometimes round, as in the *muſculus biceps*; ſometimes membranous, as in the muſcles of the belly. Theſe are the parts conſtitutive of a muſcle. It hath beſides theſe, parts derived from the poſition; and thoſe are three: The head, the belly, and the taile. The head is the beginning, this is in the part unto the which the muſcle is contracted: the belly is the thickeſt part, the taile is the ending of it, and is inſerted into the part which is moved. It is called ἀναδέσεως, and commonly *Tendo*. The ſubſtance of the tendon in all theſe parts is uniforme.

Its beginning.

The figure of tendons.

The parts from the poſition.

The use of a muscle.

The use of a muscle was set down in the last part the description, in that it was said to be the instrument of free motion, and not voluntary, because beasts have muscles, unto whome will is denyed, because it presupposeth reason. A muscle in motion performeth that which a leaver doth, when as such a heavy weight is to be lifted up, which cannot be done with the hands onely. Seeing in every organical part there are foure kinds of parts (according to *Galen*, 1 *de us. part.* c. 8.) The tendon is the principal part, which is sometimes altogether united, sometimes divided. The nerve is that part without the which the motion cannot be performed. The flesh betereth the action. The rest of the parts help and further it.

The diverse parts of a muscle.

CAP.

CHAP. II.

Of the differences and actions of the Muscles.

THE differences of muscles are taken from sundry things. First, from their substance: so some are fleshy, as sundry of the tongue and *larynx*: some are membranous, as the *constrictores* of the nose: and some are partly fleshy, and partly nervous, as the temporal. Secondly, from the quantity. The greatest of all is the first of those which extend the breast; for it doth ascend from the end of *os sacrum* to the first *vertebræ* of the *thorax*. The least of all is the internal muscle of the ear; the rest are of a mean bigness, and come neer either to the biggest or the least. From the quantity, the muscles, are called either long, broad, or thick. Thirdly, from the situation: from hence some are called external, some internal, some ob-

oblique, ſome ſtraight, ſome tranſverſe. Fourthly, from the figure: as *deltoides*. Fifthly, from their beginning: ſo ſome proceed from bones, ſome from cartilages, as thoſe of the *larynx*; ſome from tendons, as the *lumbricales*. Sixthly, from the variety of parts; ſo ſome are called *bicipites*, having two heads. Seventhly, from their compoſition; ſo ſome are ſingle, ſome double; becauſe ſome have more heads, ſome more tailes.

The cauſes of the unity and plurality of muſcles.

The unity of the membrane and belly, which wrappeth the muſcle, cauſeth the unity of it; and the plurality of the membranes and bellies, the plurality of the muſcles. Eightly, from their action: Four differences of muſcles are taken from hence: for firſt, ſome are hence called *fraterni*, or *congeneres*, brotherly; ſome *antagoniſtæ*, adverſaries. Secondly, ſome onely move themſelves, as the ſphinters; ſome other parts, as the reſt. Thirdly, ſome have one onely action, as the greateſt part of the muſcles;

ſome

some have divers actions, as the *masseter* and *trapesius*. The fourth difference is taken from the variety of the action; so some are called *flexores*, some *extensores*, some *rotatores*, some *supinatores*.

The proper action of a muscle.

As for the proper action of the muscle, it is nothing else but the contraction of it towards its beginning. Now two things ensue after this contraction; for first the part into which the muscle is inserted, must be apt to move: secondly it must be drawn towards the beginning of the muscle. The diversity of the action proceedeth from the diversity of the situation of the muscles: so a straight muscle hath a straight motion; a transverse a transverse motion, an oblique an oblique motion, and that which compasseth a part hath an orbicular motion as the sphinters.

The cause of diversity of the action.

Now of the motion of the muscles there are four differences; first, the contraction: secondly, the perseverance of the contraction: thirdly the

The difference of the motion of muscles.

the relaxation of the contraction: and fourthly, the perſeverance of the relaxation. This perſeverance is called *motus tonicus*, when as the member is ſtil kept in the ſame poſture, which is performed by that faculty which governeth the body. The efficient cauſe then of the action is the ſoul, moved by its appetite. It uſeth three inſtruments, the brain the nerve, the muſcle: the brain receiveth the charge, the nerve carrieth it to the muſcle, and the muſcle doth perſorme the action; ſo that a muſcle from the action may thus be deſcribed: a muſcle is an organical part of the body, appointed for the free contraction of it ſelfe towards the beginning, for the moving of the part into the which it is inſerted.

Motus tonicus.

The efficient cauſe of the motion.

A deſcription of a muſcle from its action.

CAP.

Cap. III.

Of the muſcles of the Eye-lids.

EAch eye lid hath four muſcles: the firſt is *frontalis*, to lift it up; the ſecond is *orbicularis major*, or the largeſt round muſcle under the frontall: the other two are called *Ciliares*, or of the eye-lids, in each of them there is one to ſhut the eye-lids, the motion of the upper is manifeſt, but of the lower obſcure. In bredth they exceed not the bredth of the cartilage. To ſhew the frontall you muſt divide the skin of the forehead where the haire beginneth, until you come to the eye-brow. *Orbicularis major* lieth under the frontall and appeareth when the skin of the eye-brow is removed. The *Ciliares* compaſſe the eye-lids orbicularly.

The occipitall, or nowle-muſcles meet with the frontalls, or thoſe of the fore-head in the upper part.

part. The occipitalls begin on each ſide of the nowle, and marching upwards by a broad and membranous tendon to the eares, meet with the frontalls. If theſe be very fleſhy, they are able to draw back the whole skin of the head.

CAP. IV.

Of the muſcles of the Eye.

The ſtraight muſcles.

THeſe are in number ſixe; four ſtraight, and two oblique. The firſt of the ſtraight is called *attollens*, or *ſuperbus*; that which pulleth up the eye. The ſecond is *deprimens*, or *humilis*, that which draweth downe the eye. The third is *adducens*, or *bibitorius*, that which pulleth the eye to the noſe. The fourth is called *abducens*, or *indignatorius*, that which pulleth it from the noſe.

The beginning and inſertion of them.

All theſe ſpring from the cavity of the bone, making the orbit of the

the eye about the hole of the optick nerve; and being compaſſed with much fat, paſſing under the *conjunctiva*, end by a broad, but thin *aponeuroſis*, in the *cornea*, or horny membrane, where it beginneth to be cleer.

The oblique muſcles are called *circumagentes*, winders about, and *amatorii*, or love-makers, and are in number two; the firſt is *obliquus major*, *ſeu ſuperior*, the uppermoſt and largeſt. This beginneth within the orbit of the eye, by the hole of the optick nerve, and paſſing to the upper part of the great corner of the eye, endeth in a ſmall tendon, which paſſeth through a tranſvers cartilage there placed, as a cord through a pully, and is inſerted into the upper ſide of the *cornea*. The ſecond is *obliquus minor*, or inferior, the lowermoſt and ſmalleſt. This ſpringeth from the lower, and almoſt outer part of the orbit, about the chink, which doth unite the bones of the upper jaw-bone

The oblique muſcles.

bone, neer to the glandule, and paſſeth obliquely to the outer corner of the eye, and in the upper meeteth with the tendon of the other oblique muſcle. This bringeth the apple of the eye to the noſe, as the other draweth it from it.

How theſe muſcles are to be ſhewed.

Before you ſhew the muſcles of of the eye, cut off the fat with the ciſſars; then ſhew firſt the *obliquus major*, then the *obliquus minor*, and laſt of all the four ſtrait muſcles. Nevertheleſſe, let the *obliquus major* remain laſt; when all the reſt are taken away, that you may ſhew the tendon of it paſſeth through the pulley the more plainly.

CHAP. V.

Of the muſcles of the Noſe.

The raiſing up muſcles.

THE noſe hath ſix muſcles, whereof there be *erectores*, or raiſers upwards, two; one one ach ſide of the noſe. They begin where the

the hole is under the glandule; and so cleaving to the bone are outwardly inserted and carried to the *Pinnæ*, or sides of the nose.

There are two also called *dilatatores*, or openers on each side one, which dilate the nostrils, not raising up the nose. They are like to a leafe of the myrtle tree. They have their beginning from the bone of the upper jaw neer to the sides of the nose, and being placed about the cartilage, end in the top of the nose called *pirula*, the tip. The stretching muscles.

There are also two *constrictores*, pullers together of the nostrils. These are small and membranous, hid under the membrane which covereth the inside of the nose. They have their beginning where the bone of the nose endeth, and are implanted in the inner side. The pullers together.

CAP.

CAP. VI.

Of the muſcles of the lips.

The common muſcles.

THE muſcles of the lips are either common to the cheeks and lips, or proper onely to the lips. The common are two: the firſt is *zygomaticus*, or *detrahens quadratus*: this is a thin muſcle, reſembling a membrane enterlaced with fleſhy fibres. This hath its beginning from the *vertebræ* of the neck in the outer ſide, the ſhoulder-blade, the cannel bone and the breſt-bone, and mounting up by oblique fibres to the face, is implanted in the chin where the two lips are joyned: this muſcle doth draw the cheeks downward. The

1.

ſecond is called *buccinator*, or *buccco*; this lieth under the former, in the upper part of it. It doth make up all that part of the cheek which is blown up when a trumpet is ſounded. This ſpringing from the brimmes of the upper jaw-bone circu-

2.

circularly, doth end in the brims of the lower jaw bone It is wholly membranous, and interlaced with divers *fibres*, and is so covered with the membrane which covereth inwardly the mouth, that it hardly can be severed from it. When this muscle is contracted, it is turned inwards, and so it turneth in the meat which hath escaped the teeth; and so when the meat is chewed, it is kept inwardly by the tongue, and outwardly by this muscle, that it escape not from the teeth.

The proper muscles.

Now the muscles proper to the lips, are four pair: First, *par attollens*, which beareth up the upper lips. This springeth from the first bone of the upper jaw: where the apple of the cheek is, there it is broad and fleshy: from thence marching obliquely to the forepart, it is inserted into both the sides of the lips neer to the nose. 1.

The second is *deprimens*, which pulleth down the lower lip. It springeth from the sides of the chin, 2.

chin, where two ſmall bunchings are: there it is fleſhy; from thence marching obliquely, it is inſerted into the middle of the lip: it is every where broad. 3. The third pair is *abducens*, or drawing the lips to the ſides. It ariſeth fleſhy and round from the hollowneſſe which is under the *maxilla*, and being lapped with much fat, it is inſerted into thoſe places, where both the lips are joyned together. 4. The fourth is *corrugans*, or *conſtringens*, that pair which purſeth the lips together. It is called alſo *oſculatorium*, or the kiſſing pair, which draweth the lipps together when we kiſs. This pair is framed of a fungious fleſhy ſubſtance, having orbicular fibres as the *ſphincter* hath. The ends of both the lips are made up of theſe, which appear red if we be in health, but pale if it be ſickly.

CHAP.

CHAP. VII.

Of the muſcles of the lower jaw.

THE lower jaw is moved upwards, downwards, towards the right ſide, towards the left ſide, and towards the back-part. To procure theſe motions five pairs of muſcles are appointed: The firſt is called the *temporale*. This doth ſpring from all the hollowneſſe of the bones of the Temples, by a broad, fleſhy, and ſemicircular beginning, and by degrees becomming narrower; and being carried under the yoke-bone, it is inſerted into the progreſſe of the lower jaw-bone by a ſtrong tendon. This tendon is diſperſed through the whole muſcle. The *fibræ* paſſe from the centre to the circumference. This muſcle is covered in its upper part with the *pericranium*; but in the lower part it is bare, and reſteth upon the bare *cranium*. Wherefore if this muſcle 1.

be

Why the wounds of the temporal muſcle are dangerous.

be wounded, fearful ſymptomes enſue, partly becauſe the tendon paſſeth through the whole muſcle: partly becauſe it is covered with the *pericranium*. This muſcle forcibly pulleth up the lower-jaw, and ſo ſhutteth the mouth, and ſpringeth from *os frontis*, *os ſyncipitis*, *temporum* and the *ſphænoides*. The ſecond pair is called *deprimens digaſtricum*, or *biventre*, becauſe it hath two bellys, between which a tendon lyeth: this doth pull down the jaw, and ſo openeth the mouth; It hath its beginning from the proceſſes of the veins of the temple, called *Styloidei*, where it is nervous and broad; and afterward becomming fleſhy, ſmall, and round, it paſſeth downward, and is inſerted into the inner fore-part of the jaw-bone, which is under the chin, and ſomewhat rough. The third is called *maſſeter*, becauſe it ſerveth for chewing by moving the jaw to the right and the left ſide: from its ſituation it may be called *laterale*.

laterale. This hath two beginnings: one is nervous ſpringing from the ſuture where the firſt bone of the jaw is joyned to the fourth. This beginning is large and ſtrong: the other beginning is fleſhy, proceeding from the *os jugulare*, and ſo marcheth towards the chin, and is implanted into the whole largeneſſe of the lower jaw ſtrongly. The fibres of this muſcle by reaſon of the two beginnings croſſe one another; ſo that theſe muſcles doe not only move the jaw laterally, but backward and forwards alſo.

Its beginning. 1. 2.

The fourth paire is called *pterigoidium externum*, *aliforme externum*, or *pterigoidium abducens*. This being in its beginning ſtrong, and partly nervous and partly fleſhy, doth ſpring partly from the upper externall ſides of the wing-like proceſſe, partly from the rough and ſharp line of *os cuneiforme*: then marching by ſtraight fibres, it becommeth greater. It is inſerted by a ſtrong tendon

4.

tendon into the internall lateral part of the jaw which is under the tendon of the temporall muſcle. This moveth the jaw forward, which appeareth when the lower teeth are placed above the upper. The fifth

5. pair is termed *maxillum adducens*, or *pterigoideum internum*. This draweth the jaw towards the head, or backward. This, in the beginning being thick and nervous, doth ſpring ſpom the inner cavity of the wing-like proceſſe; then becommeth fleſhy, large and thick; marching by a ſtraight paſſage it is inſerted into the lower jaw by a nervous, broad and ſtrong tendon, in the inner and hinder part of the jaw, about the civity where the nerve entereth where ſome aſperites are found.

CAP. VIII.

Of the muſcles of the Ear.

THe ear is moved, though obſcurely, four manner of ways: *viz.* upwards, downwards, forward, and backward. The muſcles which move the ear are either outward or inward. In the out ſide there are four pair. The firſt pair is called *attollens*: this is nothing but a portion of the frontal muſcle, which is carried above the temporall muſcle, and is inſerted into the upper part of the ear: It is thin and membranous in the beginning, about the ending of the frontal muſcle, and becomming narrower, it goeth down to be inſerted into the upper part of the ear. The ſecond is *deprimens*, or puller down: This ſpringing from the *muſculus cutaneus* above the *partoides*, broad, fleſhy, and ſometimes fibrous, and afterward becomming narrower

The outer muſcles, four pair.

rower, is inserted by its tendon into the root of the cartilage of the ear. The third is *abducens ad interiora*, whereby the ear is drawn forward: This is but a particle of the *musculus quadratus*, which pulleth down the cheeks. This ascending with its fibres, is implanted into the root of the ear. The fourth is *abducens ad posteriora*: this hath its beginning in the back-part of the head, from the tunicles of the muscles of the nowle, above the *processus mammillares*: being there but narrow, it is carried downward tranversly, and is inserted into the ear behind. In the inner part of the ear there are two, found out by *Aquapendente*, and *Julius Cesserius*. The first is called *externus*: it is small, springing from the skin and membrane which cover the passage of the ear; then becomming fleshy, it marcheth by a short tendon to the outer part of the *tympanum*, and is inserted about the centre of it, where within, the *malleus* or hammer

The inward muscles two.

hammer is tyed to it. The ſecond is called *internus*: this is ſmall and placed within the *os petroſum*. It hath its beginning in the *baſis* of the wedge-bone, then becomming ſomewhat fleſhy, and after the midſt of it narrower, it is divided into two ſmall tendons, whereof the one is inſerted into the upper proceſſe of the *malleus*, and the other into the neck of it.

CAP. IX.

Of the muſcle of the Tongue.

THE tongue hath four paires of muſcles by the which it is moved, according to all the differences moving by a wonderfull volubility. The firſt is *geneoglоſſum*: this pulleth the tongue without the teeth and lips. It ſpringeth from the ruggedneſſe which is ſeen in the middle of the lower jaw in the lower part of it, and is inſerted into the root of the

tongue. The ſecond is *Myloglosſum*; this helpes the former. This ſpringeth from the inner part of the lower jaw; where the fartheſt grinding teeth are; and about the root of the tongue it is inſerted into the ligament by the which the tongue is tyed to the throat. The third is called *Hypſieoloſſum*, or *retrahens*. This riſing from the middle and upper part of the bone of the tongue fleſhy, marching alongſt the tongue, it is inſerted into the middle of it. This draweth the tongue inward when it is contracted. The fourth is called *ceratogloſſum*, or *Styloglosſum*: by this it is drawne towards the ſides. It ariſeth from the *ſtyloides proceſſus* of the bone of the tongue, by a fleſhy ſmall and ſharp point; then becomming broader, it is inſerted into the ſides of the tongue.

CAP.

Cap. X.

Of the muſcles of the bone of the tongue.

THis bone is moved upwards, downwards, forward, backward, and toward the ſides, as the tongue is; becauſe it is the foundation of the tongue, and the muſcles of it ſerve for the motions of the tongue, and of the *larynx* alſo, when as the *larynx* and tongue are lifted up and let downe when we ſwallow. To performe the former actions it hath four pair of muſcles. The firſt is called *Sternohoidæium*: this ſpringing from the upper, but the inner part of the *ſternum*, and marching by the winde-pipe is inſerted into the root of the *hyoides*. The ſecond is oppoſite to this, and is called *genihyoidæum*: this ſpringing from the inner part of the chin, fleſhy, broad, and ſhort, is inſerted into the root of the bone, wher: a

cavity is to receive it. The third is *Choracohyoideum*: It riſeth at the firſt ſmall and long, but fleſhy about the neck and the Crowsbill-like proceſſe of the *ſcapulæ*; and paſſing under the *levator* of the ſhoulder-blade called *muſculus patientiæ*, it is inſerted into the point of the *hyoides*: it hath two bellies, and is very long. The fourth is *ſtyloceratohyoidæum*: This riſeth from the root of the *proceſſus ſtyloides*, and endeth in the points of the *hyoides*.

CAP. XI.

Of the muſcle of the larynx.

The common muſcles.

THE muſcles of the *larinx* are either common or proper. The *common* are four; two called *bronchii*, and as many called *hyothyroidæi*. The *Hyothyroides* doth lift up the *larynx*. This ſpringeth from the whole *baſis*, almoſt of the bone of the tongue, and is im-

implanted into the extern d middle part of the *thyroides*, or buckler-like cartilage. *Bronchius* pulleth down the *larynx*: This ſpringing from the inner part of the *ſternum*, mounteth up to the *baſis* of the *thyroides*, by the pipes of the *trachea arteria*. This muſcle with its fellow raiſeth up the length of the wind-pipe in beaſts and fowles, which have a long neck. The proper muſcles are in number five. The firſt, is *Cricothyroides anticus*: this dilateth it. This ſpringeth from the fore and external part of the ring-like cartilage, and is inſerted into the lateral part of the *Thyroides*. The ſecond is *Cricothyroides lateralis*. It purſeth together the *thyroides*. It ſpringeth from the lateral parts of the *cricoides*, and is inſerted into the external lateral parts of the *thyroides*. The third is *Cricoarytenoides poſticus*: this openeth the warlike cartilage. This paſſeth from the back part of the *cricoides* to the *aritenoides*. The fourth is *Thyroa-*

The proper muſcles.

rytenoides, or *glottidæus*: this helpeth the former, and ſpringing from the inner and fore-part of the *thyroides*, is inſerted into the lateral parts of *artenoides*. The fifth is *Artenoides*: this is a round muſcle, compaſſing the ewar-like cartilage.

CAP. XII.

Of the muſcles of the uvula *and throat.*

THE *Uvula* hath two muſcles to hold it up: for it is pulled down by the weight of the meat as it paſſeth by it. The firſt is *Pterystaphilinus externus*: this ſpringeth from the upper jaw, a little below the furthermoſt grinder, and is inſerted into the ſide of the *uvula*. The ſecond is *Pteriſtaphilinus internus*: this proceedeth from the lower part of the internal wing of the *pterygoides* proceſſes, and is inſerted into the *uvula* in like manner.

The

The throat or the beginning of the *œsophagus*, called *pharynx*, hath seven muscles, to wit, three paires, and one without a paire. Of the paires, the first is *sphenopharingæus*: this springeth from the sharp point of the *spenoides*, neer the *styl oides* processes, and passing downward, is inserted into the lateral parts of the throat, to pull up the mouth of the stomack. The second is *Cephalopharingeus*. It springeth from that part where the head is joyned to the neck, and marching downe it is spred about the *pharynx*, and seemeth to make the membrane of it. The third is *stylopharingeus*: This springing from the *styloides* processe, is laterally inserted into the *pharinx* to dilate it. That which hath no march is called *œsophagus*: this springing from one side of the *thyroides*, and circularly compassing the hinder part of the *pharynx*, it is tyed to both the sides of the *thyroides*, to contract the mouth of the sto-

macke, as the *ſphincter* doth the *anus*.

Cap. XIII.

Of the muſcles of the head.

The common.

THE muſcles of the head are either common or proper. *The common* are thoſe which together with the neck move the head: theſe are the muſcles which move the neck.

The preper.

The proper are theſe which onely move the head when the neck remaineth immoveable: theſe are in number fourteen, or ſeven paire. Firſt, two *maſtoidæi* bend the head forward. Theſe beginning in the upper part of the *ſternum*, and the middle of the cannel-bone, are inſerted into the proceſſe, called *maſtoides*, obliquely. Theſe are placed in the forepart; behind twelve or ſix pair are placed. The firſt is *ſplenicus*, or *triangularis*: this proceeding from the ſixth *vertebra* of the breſt, and

mar-

marching to the third *vertebra* of the neck, is inſerted into the *occiput*. The ſecond, *Complexus*, or *trigeminus*. This ſpringing from the tranſvers proceſſes of the ſame *vertebræ*, is inſerted into the *occiput*. The third, *recti majores*, two: theſe ſpringing from the edge of the ſecond ſpondil, are inſerted into the *occiput*. The fourth, *recti minores*, two: theſe lye under the former, proceeding from the back-part of the firſt ſprondil, end into the *occiput*. The fifth *obliqui majores*: theſe ſpringing from the *ſpina* of the ſecond *vertebra*, reach to the tranvers proceſs of the firſt *vertebra*. The ſixth, *obliqui minores*, under; theſe proceeding from the ſame beginning, are carried to the *occiput* The oblique muſcles turne about the head: the other muſcles extend it.

CHAP.

CHAP. XIV.

Of the muſcles of the neck.

THE neck hath eight muſcles, four on each ſide: for it is extended by two pair; *ſemiſpinatum*, and *tranſverſarium*. *Semiſpinatum*: this proceeding from the *ſpinæ* of the upper ſeven *vertebræ* of the breſt, and five of the *vertebræ* of the neck, is inſerted into the edge of the ſecond *vertebra* of the neck. *Tranſverſarium*: this riſing from the tranſvers proceſſes of the ſixth upper *vertebræ* of the back is inſerted outwardly into all the proceſſes of the *vertebræ* of the neck. It is bended by four muſcles, two on each ſide; to wit, firſt, *longus*: this being placed under the *œſophagus*, doth ſpring from the third *vertebræ* of the back, and mounting up, it is tyed to all the *vertebræ*, and endeth in the fore-proceſs of the firſt *vertebra*. The third

third is *par ſpinatum*, *triangulare*, *ſcalenum*. It proceeding from the firſt rib, is inſerted into all the tranſverſe fibres of the neck, by oblique fibers internally. It is perforate to make way for the veins, arteries, and nerves which paſſe to the arms.

CAP. XV.

Of the muſcles of the Breſt.

The dilaters.

FIrſt of all theſe dilate it. The firſt 1.
is *Subclavius*: this ariſeth fleſhy from the inner part of the *clavicula*. and is inſerted into the firſt rib, neer to the *ſternum*. The ſecond is *ſerratus major*: this doth ariſe from the inſide of the ſhoulder blade, and the two upper ribs, and is inſerted into the lower five true ribs, and two upper ſhort ribs. The third is *ſerratus poſticus ſuperior*: this lying under the *rhomboides*, ſpringeth from the edges of the three lower *vertebræ* of

of the neck, and from the edge of the first *vertebra* of the back nervous, and is inserted into the three upper ribs.

4. The fourth, is *serratus posticus inferior*: this ariseth from the edges of the three lower *vertebræ* of the back, and of the first *vertebra* of the loyns, and is inserted into three or four lower short ribs.

5. Fifthly, *The eleven external intercostals*, which perform the office but of one muscle. These spring from the lower part of the upper rib, and are inserted into the upper part of the lower rib obliquely, and forward.

The contracters.

These that follow contract the breast. First, the *triangularis*: this arising from the inward and lower part of the *sternum*,

1. is inserted into the cartilages of the two upper ribs. This as a pillow receiveth the upper part of the heart. The second is *sacrolumbus*: this arising

2. from the *os sacrum*, and the sharp processes of the *vertebræ* of the loins, endeth in the upper ribs,

about

about their beginnings, bestowing upon each rib a tendonous latch. Thirdly *the eleventh internall intercostals*, which are as one muscle. These passe obliquely from the lower to the upper rib, filling the distance: their fibres are opposite of those of the external, representing a Saint *Andrewes* Crosse. These serve for violent breathing, being seconded by the oblique muscles of the belly. 3.

Diaphragma, or *septum transversum*, is the instrument of free motion. The head of it is in the centre, but the taile in the circumference of the lower short ribs. For from the fourth short rib to the last, cleaving to the brims of them, it passeth to the double or triple fleshy and tendonous productions to the twelfth *vertebra* of the back, & from thence to the third *vertebra* of the loines.

CAP.

Cap: VI.

Of the muſcles of the Loynes.

THE back doth not move for want of muſcles, and by reaſon of the ribs between the neck and loynes whilſt the outward parts are moved. Onely the laſt ſpondil of the back is moveable; for it doth not receive, for it is received both above and under: but ſeeing it is annexed to the loynes, the motion is rather to be aſcribed to the loines than to the back. *The loines* are bended by two muſcles called *flexores*; there is one on each ſide. They ſpring from the hinder part of the edge or brim of the flanck-bon, and inner laterall part of the *os ſacrum*, and march by the tranſverſe proceſſes of the *vertebræ* of the loines, fleſhy to the laſt rib.

Benders two.

They are extended by four muſcles whereof there are two in each ſide. Theſe are ſo wrapped to-

Extenders four.

ge-

gether according to the length of the *ſpina*, that they may ſeem either to be as many pairs of muſcles as are ſpondils, or one onely pair giving tendons to the *vertebræ*. The firſt is *ſemiſpinatus*; this ſpringeth by a nervous beginning from all the *ſpinæ* of the *vertebræ* of the loins, and *os ſacrum*, and ends in the tranſvers proceſſes of the *vertebræ* of the loins, and all thoſe of the breſt. The ſecond is *ſacer*: this ariſeth by a ſharp and fleſhy beginning from the hinder part of *os ſacrum*, and is inſerted into the roots of the *ſpinæ* of the ſpondils of the back. If theſe four muſcles conſpire together, they keep the *ſpina* immoveable: but if thoſe of the one ſide do only move, it is drawn to one ſide.

CAP.

CHAP. XVII.

Of the muſcles of the Abdomen.

IT hath ten muſcles; five on each ſide. The firſt is *obliquus deſcendens*: this being parted into ſeven or eight fleſhy portions, whereof the three greateſt are finger-like inſerted into *ſerratus maior*, it ſpringeth from the lower ſide of the ſixth, ſeventh, eighth, and ninth lower true ribs: then going down obliquely, it cleaveth to the bended part of the outſide of the *os ilium*, and to the edge of *os pubis*; then it endeth by a broad tendon in the *linea alba*. Wherefore it hath its beginning both above and below, but ending in *linea alba*. The ſecond is *obliquus aſcendens*: this ariſeth from the ſharp point of *os pubis*, and from the top of the whole bending of *os Iſtium*, and cleaving to the four utterмoſt ſhort ribs, by a double tendon, clipping the ſtraight

muſcle

muſcle it endeth in the *linea alba*. The fibres of this being oppoſite to thoſe of the former, repreſent a Saint *Andrews* Croſſe. The third is *rectus*; this ariſeth from the lower part of the *ſternum*, about the *cartilago xyphoides*, fleſhy; or rather from the cartilaginous ending of the ribe, and marching along the belly, it is inſerted into the brim of the *os pubis*, by a thick and nervous tendon. It hath three inſections, which ſome accompt ſeverall muſcles; two are about the navel, and one even with the navel. If the fourth be found it is placed under the navel. Theſe interſections firſt ſtrengthen the muſcle as knots doe reeds. Secondly, they further the extenſion of it in violent motions: ſo Tailers, to cauſe a cloth ſtockin to ſtretch and ſit cloſe, cut the cloth bias. The fourth is the *pyramidall*: this is placed above the lower part of the *muſculus rectus*. It ſpringeth from the *os pubis*. Moſt commonly there is found one in each

each side. Sometimes they are so united that they seem one broad muscle; sometimes they are altogether wanting, and then the ending of this is fleshy, whereas otherwise it is tendonous. These strengthen the ends of the *musculi recti*. The fifth is the *transversus*: this arising from the transverse processes of the *vertebræ* of the loynes below, it is tyed to the arch of the hanch-bone, but above the inner part of the short ribs; and passing from thence to the *cartilago xiphoides* under the straight muscle, it endeth by a broad tendon in *lineæ albæ*. This *lineæ albæ* beginning at the *cartilago ensiformis*, passeth directly by the navel to the joyning of the *os pubis*. It is framed of the membranous tendons of all the muscles of the belly, the straight excepted. But seeing the tendons of the muscles of the right side are so firmly united to the left, that no signe of separation can be discerned, it is not seen but between the two

straight

ſtraight muſcles. The muſcles have their denomination from their ſituation and the texture of their tendons. While the body is at reſt, theſe ſtrengthen the parts ſubjacent, and encreaſe their heat : in action, firſt, they further the excretion of the excrements : ſecondly, they help the delivery of the infant in labour : thirdly they further ſtrong breathing: fourthly, they bend the *ſpina* in violent exerciſes.

CAP. XVIII.

Of the muſcles of the genitals.

PENIS, or the Prick of Man, hath four muſcles, two on each ſide; The firſt is *erector*, or *director* : this ariſeth from the inner port of the hanch-bone, and being tyed by the ſide to the ligament of the pricke, it reacheth to the middle of it. The ſecond is *accelerator* : this ariſeth from the internall

internall knob of *ischium*, below the laterall ligament of the pricke, and from the *sphincter* of the *anus*, and being placed with his fellow under the *urethra*, passeth to the middle of the yard.

The *Clitoris*, or little prick in women, have four muscles. The two uppermost being round, they arise from the internall knob of the *ischium*, and being placed by the laterall ligaments, cause the erection of it. The two lower are broad and smooth, and proceeding from the *sphincter* of the *anus*, are inserted into the brims of the *cunnus*

The *stones* have two muscles to pull them up: they are called *cremastores*, from κρεμάζω, to hold up. In health they keep the stones wrinkled, whereas in sickness they are flaggy, and hang downe. They are thought to spring from the fore and inner brim of the *os ilium*: but they seem rather to be the endings of the oblique ascending muscles neer to the *os pubis*, which

which compaſſing without the productions of the *peritonæum*, paſſe with the ſpermatick veſſels towards the ſtone. The Cremaſter in women are ſhorter then in men, and are placed above the production of the *peritonæum*: through this production the round ligaments of the *matrix* paſſeth, which in women is compaſſed with a fleſhy ſubſtance, which reſembleth the cremaſter in men.

CHAP. XIX.

Of the Muſcles of the Bladder and Anus.

THE Bladder hath but one muſcle, called *ſphincter*, it doth compaſſe round the neck of the bladder. Above it compaſſeth the *proſtrates*, and is ſeated under them alſo. The fibres are orbicular. If one ſide be taken with the palſie, an involuntary excretion of the urine doth not alwaies follow,

follow, becauſe a nerve is implanted into the outſide of the neck of the bladder. In women it reacheth to the hole by the which the urine paſſeth, and it ſeemeth to form it.

The *anus* hath three muſcles. The firſt is *ſphincter*: this is fleſhy, and without the ſtrait gut two inches broad. The fibres are orbicular. It doth not ſpring from any adjacent bone, but is only inſerted into the *coccyx*. The ſecond and third are called *levatores*; they are placed within the gut, and are large and fleſhy. They are tyed to the ſides of the gut, and reach to the *ſphincter*: they poſſeſs the diſtance between the *iſchium* and the *os ſacrum*.

CAP. XX.

Of the muſcles of the Shoulder-blade.

THE ſhoulder-blade is moved forward, backward, upward,

upward and downward. It hath foure proper muſcles. The firſt is called *trapezius* or *cucullaris*: this hath its beginning from the lower part of the nowle-bone towards the eare, fleſhy: but from the *poſterior* proceſſes of the *vertebræ* of the neck, and the eight upper *vertebra* of the breſt, it ſpringeth membranous and broad, and is inſerted into the *baſis* of the *ſcapula*. The ſecond is *levator*, or *patientia muſculus*: this hath its beginning from the tranſverſe proceſſes of the firſt, ſecond, third, and fourth *vertebra* of the neck, which beginnings being united, are inſerted into the upper corner of the ſhoulder-blade. The third is *ſerratus minor antieus*: this ſpringing from the four upper ribs before they become cartilaginous: cleaving to theſe be foure fleſhy portions, repreſenting the teeth of a ſaw, and are inſerted by a broad tendon neer to the anchor-like proceſſe of the *ſcapula*. The fourth is *rhomboides*; this is placed immediately

1.

2.

3.

4.

under the *cucullaris* This ſpringeth fleſhy from the hinder proceſſes, or *ſpina* of three of the *vertebra* of the neck and ſo many of the breaſt; and is inſerted by as broad a fleſhy ending, as the beginning was into the *baſis* of the ſhoulder-
5. blade. The fifth is *ſerratus major*: this hath its beginning from the eight upper ribs before they become griſtly. The beginnings are fleſhy portions like to the teeth of a ſaw, by which it is inſerted into the like portions of the oblique deſcending muſcle. Then it marcheth fleſhy, by the ribs upwards at the ſides of the breſt, and is implanted by a large fleſhy end into the whole inner *baſis* of the *ſcapula*. It moveth the ſhoulder-blade forward and downward. The beginning muſt be in the breſt where the fleſhy portions are; becauſe there the nerves are inſerted: and that part is ſteady, which the *ſcapula* is not.

CAP. XXI.

Of the muſcles of the Arme.

THE arme hath five motions, for it moveth backward, forward, upward, downward, and circularly. It is moved upward by two erectors, *deltoides* and *ſupraſpinatus*. Firſt, *deltoides ſpringeth* from the middle of the cannel-bone, the top of the ſhoulder, and the whole *ſpina* of the *ſcapula*, and is inſerted into the middle of the ſhoulder-bone. The ſecond is *ſupraſpinatus*, or *ſuperſcapularis ſuperior*: this placed in the cavity above the *ſpina* of the ſhoulder-blade, and paſſing under the uppert part of the *ſcapula*, is inſerted into the neck of the ſhoulder-bone, which it compaſſeth with a broad tendon. It is pulled downe by *latiſſimus*, and *retundus major*

1.

2.

Depreſſors.

Latiſſimus, ſo called from its largeneſſe; for with its mate it covereth the whole backe. It is called

1.

ani ſcalptor, or *terſor*; for without theſe this office could not be performed. This ſprings by a broad membranous beginning from the hinder proceſſes of the *vertebræ* of the breſt, beginning at the ſixth, and reaching to the middle of the *os ſacrum*, and upper part of the *os ilium*: then paſſing upwards, when it is come to that part of the back where the ribs bend, it becommeth fleſhy, and paſſeth by the lower corner of the *ſcapula*: where becomming narrower, it is inſerted under the upper end of the ſhoulder-bone by a ſhort broad tendon betweene the *muſculus pectoralis*, and the *rotundus detrahens*. *Rotundus major*, or more properly, *teres major*, becauſe it is long without edges, this ſpringeth from the whole *coſta* of the *ſcapula*, and is inſerted into the ſhoulder-bone, a little below the neck of it.

Movers forward. 1.

It is drawn forward by *pectoralis* and *coracoideus*. *Pectoralis*, it beginneth from the ſeventh, ſixth, and fifth true ribbes, the *ſternum*,

ſternum, and above the halfe of the cannel-bone, and by a ſharpe tendon it is inſerted into the ſhoulder-bone, between the *deltoides* and the *biceps*. *Coracoides*, it beginneth at the *coracoides apophyſis*, and endeth about the middle of the ſhoulder-bone. 2.

It is moved backward by three: *infraſpinatus*, or *ſubſcapularis*, or *immerſus*, and *rotundus minor*: *infraſpinatus*, or *ſubſcapularis*, it poſſeſſeth the whole cavity of the *ſcapula*. It ſpringeth from the *baſis* of it, fleſhy, and ſo continuing, paſſeth forward; but becomming ſtill narrower to the necke of the *ſcapula*, at the laſt it getteth a broad tendon, by the which it is inſerted into one of the ligaments of the arme. *Rotundus minor*, or *ſuperſcapularis inferior*: this ariſing from the *baſis* of the *ſcapula* by a fleſhy beginning, marcheth forward; and becomming narrower is inſerted into the fourth ligament of the arme, by a broad and ſhort tendon. Pullers backward.

Nola.

One thing is to be noted, that the the tendon of *musculus latissimus*, together with the tendon of *musculus temporalis*, cause that cavity which is seene in the cavity of the armepit; for the tendon of the *latissimus* frameth the inside, but that of the *temporalis* the outside of the cavity.

CAP. XXII.

Of the Muscles of the Ulna.

THE elbow hath two bones, *ulna* and *radius*. The *ulna* serveth for flexion, and extension; but the *radius* for pronation and supination. The *ulna* is bended by two, to wit, *biceps*, and *brachieus internus*. *Biceps* hath two beginnings from the shoulder-blade. The first is that which is outward, tendonous and round; it springeth from the upper brim of the hollownesse of the *scapula*, and marcheth under the ligaments of the joynt

Benders of *ulna*. 1.

joynt, above the top of the ſhoulder by the chink in the bone made for that purpoſe, where it is wrapped by a ligament which riſeth from the hollowneſſ. The ſecond head is broader then the firſt, framed partly of a tendon, and partly of fleſh; it ſprings from the anchorlike proceſſe of the ſhoulder-blade; then deſcending by the inner part of the top of the *ſcapula*, it meeteth with the former; below the head of the ſhoulder-bone, it becommeth a ſtrong fleſhy muſcle: afterward ending in a thick, round, and ſtrong tendon, it is inſerted into the long knob, under the upper end of the *radius*. This is that tendon which cauſeth great paine if it be pricked in phlebotomy. *Brachiæus internus* lying under the *biceps*, riſing from the middle of the ſhoulder-bone, unto which it cleaveth firmly: it is inſerted both into the *ulna* and *radius* where they meet.

The *ulna* is extended by foure muſcles, *longus*, *brevis*, *brachiæus externus* Extenders.

1. *externus*, and *cubitalis*. *Longus* ariſeth from the lower brim of the *ſcapula* neer to the neck, where it hath a peculiar hollowneſſe; and endeth in the knob of the el-
2. bow. *Brevis* riſing from the hinder part of the neck, of the ſhoulder-bone, endeth in like manner in the *olecranum*; both theſe make
3. but one ſtrong tendon. *Brachiæus externus* placed under theſe two: it is placed on the outſide of the ſhoulder-bone: it is confouuded with the other two, and endeth where they doe, but this ſeemeth to *Spigelius* (*de human. corp. fabrica lib.* 4. *c.* 15.) to be but a fleſhy portion ariſing about the middle of the ſhoulder, and no peculiar
4. muſcle. *Cubitalis*, or *anconeus*: it is placed in the hinder part of the bending of the elbow, which is called ἀγκὼν, and anſwereth to the *muſculus poplitæus*: this ariſeth from the lower and hinder part of the ſhoulder bone, and placed between the *ulna* and the *radius*, it endeth by a nervous tendon in the

the laterall part of the elbow an inch below the *olecranum*. The extending muſcles have ſtraight fibres.

CAP. XXIII.

Of the Muſcles of the Radius.

THe *Radius* hath two ſorts of muſcles: for ſome are called *pronatores*, or pullers down: ſome *ſupinatores*, or raiſers up. The *pronatores* are two in number: the firſt is, *pronator ſuperior rotundus*: this ſpringeth from the root of the inner knob of the ſhoulder-bone, and from the inner ſide of the *ulna*, where it is joyned to the arme-bone; and endeth obliquely about the middle of the *Radius* by a membranous tendon. The ſecond is *pronator inferior quadratus*: this is altogether fleſhy. This ſpringeth from the lower and inner part of the *ulna* two inches broad; then marching obliquely above the ligament which joyneth the *radius*

The pronators. 1. 2.

to the *ulna*, it endeth in the inside of the *radius*. The ending is as broad as the beginning; wherefore it is called *quadratus*, or four square.

Supinators.

The *supinatores* are in like manner two. The first is *supinator longus*, so called, because of all the muscles which march by the *ulna*, it hath the longest belly. This springeth fleshy from the edge of the inner knob of the *ulnæ*, and marching obliquely under the *radius*, is implanted by a membranous tendon into the upper part of the lower *appendix* of the *radius*, bending somewhat to the innerside. The second is *supinator brevis*: this springeth from the outward part of the ligament of the lower end of the arme-bone, and from the hinder processe of the *ulna*; being without membranous, and within fleshy, it is inserted into the middle of the *radius*.

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2.

Cap. XXIV.

Of the muſcles of the Wriſt.

THE Wriſt is bended by two muſcles in the inſide. The firſt is *cubitæus internus*: this doth ariſe by a fleſhy and nervous beginning from the ſharp inner knob of the ſhoulder bone; then paſſing fleſhy by the length of the *ulna*, it doth end by a tendon, partly nervous, and partly fleſhy, in the fourth bone of the firſt ranke in the Wriſt. The ſecond is *brachiæus internus*: this ariſing from the ſame place, and paſſing alongſt the *radius*, is inſerted into that bone of the back of the hand which doth hold up the fore-finger.

Benders. 1. 2.

Two externall muſcles ſtretch out the *carpus*. The firſt is *radiæus externus, ſive bicornis*: this ariſeth from the ſharpe edge of the outer knob of the ſhoulder-bone in the upper part of it by a broad beginning: then becomming fleſhy, it paſſeth

Extenders. 1.

to the *ulna*, it endeth in the inside of the *radius*. The ending is as broad as the beginning; wherefore it is called *quadratus*, or four square.

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the lower end of the arme-bone, and from the hinder proceſſe of the *ulna*; being without membranous, and within fleſhy, it is inſerted into the middle of the *radius*.

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CAP. XXIV.

Of the muſcles of the Wriſt.

THE Wriſt is bended by two muſcles in the inſide. The firſt is *cubitæus internus*: this doth ariſe

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finger.

Two externall muſcles ſtretch out the *carpus*. The firſt is *radiæus externus, ſive bicornis*: this ariſeth from the ſharpe edge of the outer knob of the ſhoulder-bone in the upper part of it by a broad beginning: then becomming fleſhy, it paſſeth

Extenders. 1.

to the *ulna*, it endeth in the inside of the *radius*. The ending is as broad as the beginning; wherefore it is called *quadratus*, or four square.

Supinators. The *ſupinatores* are in like manner two. The firſt is *ſupinator longus*, ſo called, becauſe of all the muſcles which march by the *ulna*, it hath the longeſt belly. This ſpringeth fleſhy from the edge of the inner knob of the *ulnæ*, and marching obliquely under the *radius*, is implanted by a membranous tendon into the upper part of the lower *appendix* of the *radius*, bending ſomewhat to the innerſide. The ſecond is *ſupinator brevis*: this ſpringeth from the outward part of the ligament of the lower end of the arme-bone, and from the hinder proceſſe of the *ulna*; being without membranous, and within fleſhy, it is inſerted into the middle of the *radius*.

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CAP.

CAP. XXIV.

Of the muſcles of the Wriſt.

THE Wriſt is bended by two muſcles in the inſide. The firſt is *cubitæus internus*: this doth ariſe by a fleſhy and nerrvous beginning from the ſharp inner knob of the ſhoulder bone; then paſſing fleſhy by the length of the *ulna*, it doth end by a tendon, partly nervous, and partly fleſhy, in the fourth bone of the firſt ranke in the Wriſt. The ſecond is *brachiæus internus*: this ariſing from the ſame place, and paſſing alongſt the *radius*, is inſerted into that bone of the back of the hand which doth hold up the fore-finger.

Benders. 1. 2.

Two externall muſcles ſtretch out the *carpus*. The firſt is *radiæus externus, ſive bicornis*: this ariſeth from the ſharpe edge of the outer knob of the ſhoulder-bone in the upper part of it by a broad beginning: then becomming fleſhy, it paſſeth

Extenders. 1.

passeth to the middle of the *radius*, where it becommeth a strong tendon; which presently is divided into two tendons more broad then thick. Both these passe a little asunder by the *radius* under the ligament, whereof one is inserted into the bone which stayeth the first finger, and the other into the bone which stayeth the middle finger. The second is *cubitæus externus*: this hath its beginning from the root of the external knob of the shoulder-bone, in the upper end of it: when it is come to the wrist, it becommeth a strong round tendon, and is inserted into the upper part of that bone which stayeth the little finger, not farre from the wrist.

2.

Cap. XXV.

Of the Muscles of the Palme of the Hand.

THis is thought to have two muscles. The first is *palmaris*; this

this ariſeth from the inner knob of the ſhoulder-bone round and nervous and placed under all the muſcles, it mounteth over the *ligamentum annulare*. Then it is dilated into a broad membrane, which cleaveth firmly to the skin of the palme of the hand, for firme apprehenſion, and quickneſſe in feeling, and endeth about the firſt joynts of the fingers. The ſecond is *caro quædam quadrata*, or a fourſqare fleſhy ſubſtance: this ſpringeth from the *membrana carnoſa* under *mons lunæ*, where the eight bone of the wriſt is placed. From thence it is carried under the *muſculus palmaris*, to the middle of the palme of the hand, and inſerted into the outſide of that tendon which carrieth the little finger from the reſt. This repreſenteth two or three muſcles, and ſerveth for the hollowing of the palme of the hand, to forme *Diogenes* his cup by, bringing the fleſhy eminence under the little finger unto the tenar.

CAP.

Cap. XXVI.

Of the muſcles of the four fingers.

THE fingers are bended, extended and moved laterally. Now the muſcles which performe theſe motions either belong to the other fingers, or to the thumbe.

Benders of the four fingers,

The fingers are bended by two muſcles. The firſt is *ſublimis*: this ſpringing from the inſide of the inner knob of the ſhoulder-bone;

1. and about the wriſt it produceth four tendons, which end about the ſecond joynts of the fingers. Theſe are hollow to give way by a chink to the tendons, of the *profundus*. The ſecond is *profundus*,

2. this ariſeth from the upper parts of the *ulna* and *radius* under the joynt and being ſeparated into four tendons, they are implanted into the third joynts of the fingers, under the *ligamentum annulare*, by the tendons of the *muſculus ſublimis*, under which they lye. The toes are extended by three muſcles, whereof

Extenders.

where of one is common, and two proper. The common is *extenſor magnus:* this ariſing from the outer knob of the arme-bone, about the wriſt, is divided into four tendons, which end in the lowermoſt joynts of the fingers. The proper are two; the firſt is *indicator*, becauſe it belongeth to the fore-finger. It ariſeth from the outward and middle part of the *ulna*, and by a double tendon it endeth in the ſecond joynt of the fore-finger: but one of the tendons becommeth one with the tendon of the *extenſor magnus*. The ſecond is *auricularis*, becauſe it belongeth to the little finger. It ariſeth from the upper part of the *radius*, and marching between the *ulna* and the *radius*, it is inſerted outwardly by a double tendon into the little finger.

Movers laterally.

The fingers are laterally moved two manner of waies: for either they are brought to the thumbe, or they are carried from it. Theſe motions are performed by two ſorts

Cap. XXVI.

Of the muſcles of the four fingers.

THE fingers are bended, extended and moved laterally. Now the muſcles which perform theſe motions either belong to the

Benders of the four fingers, 1.

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tendons, they are implanted into the third joynts of the fingers, under the *ligamentum annulare*, by the tendons of the *muſculus ſublimis*, under which they lye. The toes are extended by three muſcles,

Extenders.

whereof

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where of one is common, and two proper. The common is *extensor magnus:* this arising from the outer knob of the arme-bone, about the wrist, is divided into four tendons, which end in the lowermost joynts of the fingers. The proper are two; the first [illegible] because it belongeth [illegible] from [illegible] part of [illegible] tendon [illegible] of the [illegible] tendon [illegible] tendon. The [illegible] it be- [illegible] It ari- [illegible] *radi-* [illegible] *ulna* [illegible] ward- [illegible] little finger.

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The fingers are laterally moved two manner of waies: for either they are brought to the thumbe, or they are carried from it. These motions are performed by two sorts

Movers laterally.

Cap. XXVI.

Of the muſcles of the four fingers.

THE fingers are bended, extended and moved laterally. Now the muſcles which performe theſe motions either belong to the other fingers, or to the thumbe.

Benders of the four fingers,

The fingers are bended by two muſcles. The firſt is *ſublimis*: this ſpringing from the inſide of the inner knob of the ſhoulder-bone; and about the wriſt it produceth four tendons, which end about the ſecond joynts of the fingers. Theſe are hollow to give way by a chink to the tendons, of the *profundus*.

1.

2. The ſecond is *profundus*, this ariſeth from the upper parts of the *ulna* and *radius* under the joynt and being ſeparated into four tendons, they are implanted into the third joynts of the fingers, under the *ligamentum annulare*, by the tendons of the *muſculus ſublimis*, under which they lye.

Extenders. The toes are extended by three muſcles, whereof

where of one is common, and two proper. The common is *extenſor magnus:* this ariſing from the outer knob of the arme-bone, about the wriſt, is divided into four tendons, which end in the lowermoſt joynts of the fingers. The proper are two; the firſt is *indicator*, becauſe it belongeth to the fore-finger. It ariſeth from the outward and middle part of the *ulna*, and by a double tendon it endeth in the ſecond joynt of the fore-finger: but one of the tendons becommeth one with the tendon of the *extenſor magnus.* The ſecond is *auricularis*, becauſe it belongeth to the little finger. It ariſeth from the upper part of the *radius*, and marching between the *ulna* and the *radius*, it is inſerted outwardly by a double tendon into the little finger.

Movers laterally.

The fingers are laterally moved two manner of waies: for either they are brought to the thumbe, or they are carried from it. Theſe motions are performed by two ſorts

Interoſſei.

ſorts of muſcles, called *interoſſei*, and *lumbricales*. The *interoſſei*, ſo called, becauſe they are placed betweene the bones of the *metacarpium*: they are fleſhy and round, and ſpring from the bones: unto the which they are tyed: they paſſe ſtraight alongſt theſe bones: theſe when they are come to the roots of the fingers, they paſſe into tendons which cleave to the ſides of the fingers, and end in the ſecond joynt by their tendon. Six are placed between the three diſtances, betweene the bones of the *metacarpium*, ſo that there are two betweene each diſtance: whereof one doth paſſe to the lower, one to the upper part of the tendon. The middle and ring finger receiveth two tendons, but the fore and little finger but one. The *lumbricales* are in number foure: theſe ariſe in the diſtanes of the tendons by the wriſt, and meet with the *interoſſei* about the firſt joynt of every finger. The firſt is inſerted into the ring finger; the ſecond and third

to

to the middle-finger; but the fourth to the fore-finger: these are not one with the tendons of the *interossei*.

Abducing muscles, two.

Besides these muscles, the forefinger and the little finger have one *musculus abducens*. That of the fore-finger springeth from the middle of the *ulna*: then neer the wrist it is parted into two tendons which passe under the ligament. The upper is implanted at the root of the fore finger; but the lower into the root of the middle finger. That of the little finger, called *hypothenar*, is placed in the palme of the hand under the little finger. It is short and strong; it springeth fleshy from the fourth bone of the *metacarpium*, and is implanted by a small nervous tendon into the outside of the first bone of the little finger.

CAP. XXVII.

Of the muscles of the Thumb.

Extenders. 1.

THE thumb is extended by two muscles. The first is that which

which is called *longior*; this ariſeth fleſhy from the outer and higher ſeat of the *ulna*, where the rough line is; and the membranous, which tieth together the *ulna* and *radius*: from thence it is carried obliquely to the *radius*, and before it come to the *appendix* of it, it becommeth a round tendon, which paſſing under the annular ligament, marcheth according to the length of that ſide, which is next to the fore-finger, and is inſerted into the third bone of it. The ſecond is *brevior*: this extendeth the ſecond and third joynt of the thumbe. It ariſeth from the ſame line fleſhy: it paſſeth obliquely above the *radius*. By one tendon it is implanted to the root of the firſt joynt of the thumbe; by the other becomming membranous, it cleaveth faſt to the ſecond and third bone of the thumbe.

2.

Benders.

1. It is bended by one muſcle; which ſpringing from the inner part of the *ulna*, is implanted into the firſt and ſecond joynt of the thumb.

thumbe. This being fleſhy, which *Spigelius de hum. corp. fabric. l.* 4. *c.* 19. divided into five muſcles, together with the *abducens* of the thumbe, makes up *monticulus lunæ.*

Monticulus lunæ.

It is laterally moved by two muſcles. The firſt is called *thenar* or *abducens*, this ſpringeth from the inner part of the bone of the wriſt, which ſtayeth the thumbe, by a nervous beginning: then becomming fleſhy, it is inſerted into the firſt joynt of the thumbe by a membranous tendon: this draweth it from the fore-finger. The ſecond is *antithenar*, or *adducens*: this is ſeated outwardly, in the diſtance betweene the thumbe and fore-finger. This doth ariſe from the outer and inner ſide of that bone which ſtayeth the firſt finger; and being fleſhy is inſerted into the whole inner ſide of the firſt joynt of the thumbe; this draweth the thuube to the fore-finger.

Movers laterally.

2.

CAP.

CHAP. XXVIII.

Of the Muſcles of the Thigh.

Benders forward 1.

THE Thigh is bended forwards by three muſcles. The firſt is *pſoas*, or ψόα, and *lumbaris*: that lyeth in the inner part of the *abdomen*, upon the *vertebræ* of the loins. It ariſeth from the tranſverſe proceſſes of the two lowermoſt ſpondils of the backe, and marching by the inſide of *os ilium*, it is inſerted into the leſſer *rotator*. The ſecond is *iliacus internus*: this ſpringing from the inſide of *os ilium*, and being joyned to the *pſoas* by his tendon, it endeth before betweene the greater and leſſer *rotator*. The third is *pectineus*: 3. this ariſing from the upper part of the *os pubis*, is implanted a little below the necke of the thigh-bone.

Bend ers backward. 1.

It is bended backward by the three *glutii*, which make up the buttockes. The firſt is the outermoſt

moſt and the greateſt: it ſpringeth from the *coccyx*, from the edge of *os ſacrum*, and from the halfe of the bending of *os ilii*, and is inſerted foure inches below the great *rotator*. The ſecond is the middlemoſt: this ſpringeth from the outer part of *os ilium*, and is inſerted into the outer ſide of the great *rotator*. The third is the lowermoſt; this ſpringeth a little lower, from the outer part of *os ilii*, and is implanted into the upper part of the great *rotator*. It is drawn to the inſide by the *muſculus triceps*: this is the biggeſt of all the muſcles of the body, and hath three beginnings, which end in one muſculous tendon. The firſt head doth proceed from the upper part of the ſhare-bone, and lying by the *pectineus*, is inſerted into the middle of the thigh-bone. The ſecond ſpringing from the middle of the ſame bone, being leſſer, is inſerted a little below the necke of the thigh-bone. The third ariſing from the lower part of the ſame

2.

3.

Drawers to the inſide.

ſame bone, being of all the lower-moſt and biggeſt, reacheth to the end of the thigh bone by a very ſtrong tendon. Theſe are inſerted into the hinder line which is in the bone. *Spigelius de hum. corp. fabric. l.* 4. *c.* 22. addeth another, 2. which he termeth *lividus*: this proceedeth from the fore-part of *os pubis*, where the cartilage is, which joyneth the two bones by a broad and fleſhy ſubſtance. As it deſcendeth obliquely, it becommeth a large tendon, but ſhort: and marching down by the inner part of the thigh, it is inſerted into the middle of the thigh-bone.

Turners towards the outſide.

It is turned towards the outſide by four ſmall muſcles called *quadrigemini*. They are placed above the articulation of the thigh one by another. 1. The firſt is called by others *Iliacus externus*, and from the figure *pyriformis*; it is longer than the reſt; it ariſeth from the lower and outer part of the *os ſacrum*. 2. The ſecond ariſeth from the

the knob of *iſchii*. The third ariſeth from the ſame part. Theſe are inſerted into the hollowneſſe of the great *rotator*. The fourth is called *quadrigeminus quadratus*, more fleſhy & broader than the reſt: it lieth two inches diſtant from the third: it ariſeth from the inner part part of the knob of the *iſchium*, and is implanted into the outward part of the great *rotator*. It is rowled oblique by two muſcles caled *obturatores*. The firſt is *obturator internus*, this rowleth it outward: this aſeth from the inner circumference of the *os pubis*, and is inſerted into the cavity of the great *rotator*. The ſecond is *obturator externus*: this ariſeth from the external circumference of the hole of the *os pubis*, and returning by the neck of the thigh-bone, as by a pulley it endeth in the cavity of of the great *rotator*, under the fourth *quadrigeminus*.

3.

4.

Rowlers obliquely

1.

CAP.

CAP. XXIX.

Of the muſcles of the Leg:

Benders.

THE ſhanke hath thirteene Muſcles, whereof four doe bend it. The firſt is *ſeminervoſus*: this beginneth at the knob of the *iſchium*, and endeth in the inner ſide of the *tibia*, towards the backſide. The ſecond is *ſemimembranoſus*: it proceedeth from the ſame knob partly nervous, and partly membranous; but it marcheth by a broad tendon to the inner and hinder-part of the *tibia*. The third is *biceps*: this ariſeth from the ſame knob of the *iſchium*; and being carried by the outſide of the *tibia* in man about the middle of the thigh, it becommeth fleſhy; and by one tendon it is inſerted into the outſide of the *tibia*. That this tendon may be be the more ſafely carried, the thigh bone is griped and covered with a ſmooth and ſlippery ligament, the fourth is

1.

2.

3.

poſticus

posticus gracilis : this ariseth from the line where the share-bone and hip-bone are joyned together, and marching downe in the inner side of the thigh, it is inserted into the inside of the *tibia*. In fat persons this seemeth to be a stiffe sinew, when they stride much. The shanke is is extended by five muscles. The first is *membranosus* : this proceeding from the upper part of the edge of the *ischium*, doth compasse both the thigh and the leg; wherefore it is called *fascia lata*, because it covereth all the muscles of the thigh and leg, reaching to the foot. If it be nipt by sharpe humours, great paine is caused. The second is *longus* : this ariseth from the upper and forepart of the edge of the bending of the *os ilium*, and passing by the inside of the thigh obliquely, it endeth in the inside of the leg : and because it is thought to bring in the leg, that it may be laid upon the other, some call it *sutorius*, the Shoo-makers muscle : but it may

Extenders.

1.

2.

be more truely called *ſartorius*, the Taylers muſcle; for when they ſow upon their ſtalls they ſit croſſe-
3. legged. The third is *rectus gracilis*; this ſpringing from the lower brim of the *os ilium*, and paſſing ſtraight alongſt the length of the thigh endeth in the *patella* by a
4. broad tendon. The fourth is *vaſtus duplex*: theſe are placed at the ſides of the *gracilis*, whereof the one is called *externus*; this ſpringeth from the root of the greater *trochanter*, it endeth a little below the
5. *patella*, cutwardly. The other is called *internus*; this ariſeth from the root of the leſſer *trochanter*, and endeth in the inſide of the leg,
6. a little below the *rotula*. The fifth is *crureus*: this lieth under the two *vaſti*; it ſpringeth from the fore-part of the *os femoris*, between the two *trochanters*, it endeth in the *rotula*. Theſe four muſcles, the *rectus gracilis*, the two *vaſti*, and the *crureus*, meeting about the knee, become one ſtrong tendon, which covereth the *patella*.

On

One thing is to be noted, that the muſcles which extend the leg are ſtronger then thoſe which draw it in, that the weight of the body may be the better upholden when we ſtand. To theſe we may adde that muſcle which is called *popliteus*, or *ſuppopliteus*, which moveth the leg obliquely: this lyeth in the hollow of the ham, above the head of the *ſolæus*: it ſpringeth from the outer knob of the thigh-bone, and is inſerted in the upper and hinder part of the leg, which it clippeth firmely. 7.

CAP. XXX.

Of the muſcles of the Inſtep.

THE Inſtep is bended when it is drawn upwards. To performe this motion it hath two: the firſt is *tibiæus anterior*: this ariſeth from the upper *epiphyſis* of the *tibia*, neere to the *fibula*, and cleaving unto the whole *os tibiæ*, about the middle of it, it becom- Benders. 1.

meth a tendon, which passing under the annular ligament of the Instep, is divided in two tendons; whereof the one is inserted into the first of those bones which are called *innominata*, without a proper name: the other is inserted into the bone set before the thumbe.

2. The second is *peronæus anterior*: this ariseth from the outer and middle part of the small focill, and being carried through the chinke of the outer ankle, it is inserted into the bone of the Instep, which stayeth the little toe: it hath two heads and two tendons. The foot is extended when it is drawn backwards: To perform this motion it hath two muscles. The first is *gemellus externus*, or *gastrocnemius externus*: this muscle hath two heads, that have seed-bones not far from their beginnings. The first head is under the ham, from the inner part of the end of the thigh bone, where it is fleshy and broad. It marching down by the back and inner part of the *tibia*, when it is come

Extenders.

1.

come to the middle of it, it becommeth tendonous, and is joyned with the tendon of *gemellus internus*. The other head likewiſe ariſeth under the ham, but from the outer part of the end of the thighbone. It paſſing down by the outward and back part of the Leg, becommeth tendonous a little above the tendon of the former; then being joyned to the former; they become one ſtrong, broad, and ſinewy tendon, which is inſerted into the heele. The ſecond is *gemellus internus*, or *gaſtrocnemius internus*: this lyeth under the former, and is of a livid colour. It ſpringeth from the *appendix* of the leſſer focil by a ſtrong nervous ſubſtance: it doth become thicker, but when it hath paſſed the middle of the *tibia* it becommeth narrower, and tendonous; and a little above the heele it is ſo united to the tendon of the former *gemellus*, that both ſeeme to be but one, and is inſerted into the heele. By this tendon Butchers hang up the

Movers obliquely.

beasts killed. The instep is moved obliquely by two. The first is *tibiæus posticus adducens pedem*, or *Nauticus*, because Sailers use it much when they goe up by the ropes. It springeth both from the greater, and lesser focill, and from the ligament which tyeth these together, it being tyed to this tendon, lyeth amongst the hinder muscles, and neere to the inner ankle it becommeth tendonous: then passing by it, it goeth to the soal of the foot, and is inserted into the lower part of the bone which is next to the *cubiforme*.

1

2. The second is *peronæus vel fibulæus posticus*: this ariseth from the upper, but hinder part of the small focill, by a nervous and strong beginning; and cleaving to the outside of the perone, it passeth down round and fleshy: the outer part is of a livid colour, but the inner of a red. When it is come to the middle of the focill it becommeth tendonous, which behind under the outward ankle, obliquely

marching

marching; is inserted under the soale of the foot into the bone set before the great toe. To these may be added the muscle which is called *plantaris*, because it covereth the whole soale of the foot. It lyeth under the *gemellus externus*, and springing from the outer part of the end of the thigh-bone, under the ham by a round fleshy beginning, then passing within the leg, between the two *gemelli*, and from thence to the soale of the foot, it covereth all the toes at the first joynt, and is inserted into all the toes. It answers *palmaris*. *Plantaris musculus.*

CAP. XXI.

Of the Muscles of the Toes.

THE toes are extended by two. The first is *longus*; it doth arise by a nervous and sharpe beginning from the fore *appendix* of the great focill, and cleaving to the ligament which uniteth the two focils, it goeth down to the *Extenders.* 1.

foot. First, it passeth under the transverse ligament; then it being divided into four tendons, they are inserted into the third and second joynt of the four toes to extend them The second is *brevis*;

2. this lieth under the former: this hath its beginning from the transverse ligament, fleshy and broad, and by its four tendons it is inserted into the first joynts of the four toes.

Benders. The benders of the toes are

1. in like manner two. The first is *longus*, or *perforans*: it lieth under the *gemellus internus*, and ariseth from the hinder part of the *tibia*, under the ham by a long and a fleshy beginning; and passing according to the length of the *tibia* unto the which it cleaveth, when it hath the middle of it, becommeth tendonous: then under the inner ankle, and the ligament which reacheth from the lower *appendix* of the *tibia*, it goeth by a hollowness of the heele to the soale of the foot; where being divided into four tendons, it passeth through

through the holes of the *flexor Brevis*, and is inserted into the third and last joynt of the foure fingers. The second is *brevis*, or *perforatus*: this springeth from the inner part of the heele-bone, and when it hath passed the middle of the foot, it is parted into foure round tendons which are inserted into the second joints of the foure toes, being perforate to give way to the tendons of the former muscle to passe to the third joynt. Thirdly, *lumbricales*, foure: these spring from the tendons of the *perforans*, small and round, and are inserted by a small tendon into the side of the first joynt, which they help to bend. The fleshy substance, which filleth up the cavity of the first joynts of the foure fingers, seemeth much to further the action of these muscles: for springing by two sharp beginnings from the lower part of the heelebone, it is inserted into the beginnings of the foure *lumbricales*:

2.

Lumbricales. 4.

The *interoſſei* are placed betweene the bones of the inſtep. Theſe *interoſſei*, ſo called, becauſe they are placed betweene the bones, in the foot, are ten in number; whereas there are but eight in the hand, becauſe the inſtep hath one bone more then the wriſt. Each of them doth ſpring from the ſide of the bone of the inſtep where it is placed; and all marching according to the length of the bone fleſhy, they are inſerted into the roots of the fingers by ſhort tendons, and ſomewhat broad. If the inner be drawn together, the finger is brought in; but if the outer be moved, the finger is carried from the reſt. Betweene the foure diſtances betweene the bones, there are eight ſuch muſcles; at the outſide of the thumbe one, and one other at the outſide of the little finger. Beſides theſe you may obſerve a ſmall tranſverſe muſcle which paſſeth from the thumbe over the firſt joynts of the fingers to the little finger. It ſeem eth to have

The tranſvers muſcle. The invention of this is aſcribed to *Caſſerius* by *Bartolinus*, *l.* 4. *c.* 14.

have a twofold uſe: firſt, to tye together the bones of the firſt joynts of the toes. Secondly, they ſave their tendons from harme when we tread upon hard things.

The great toe hath peculiar muſcles. The firſt is *extenſor*: this ſpringeth by a fleſhy beginning from the outſide of the great focill, where it parteth from the *fibula*. It cleaveth faſt to the ligament which ties the *tibea* to the *fibula*, and marching alongſt the upper part of the foot, it is inſerted into the whole upper part of the thumb. The ſecond is *flexor*: this ſpringeth from the back part of the *fibula*, about the middle of it fleſhy and pointed: then becomming thicker, about the inner anckle it becommeth tendonous and is inſerted into the laſt joynt of the thumbe: before it come to the ſecond joynt it hath a larger ſeed-like bone then the joynts of the reſt of the fingers have. The third is *adducens pollicem*, which draweth the great toe from the reſt, to the inner part of

Extenders of the great toe

1.

2.

3.

of the foot. It ſpringeth nervous from the ligament which tyeth together the heele-bone, and the *talus*, it cleaveth to the bone ſet before the thumbe, and is inſerted by a round tendon into the outſide of the firſt joynt of the great toe. The laſt is *abductor minimi digiti*: this being placed in the outſide of the foot it proceedeth from the outerpart of the heele-bone, where the knob is nervous; but becomming fleſhy, and being tyed to the bone of the *metatarſus*, which ſtayeth the little toe it is inſerted by a round tendon into the outſide of the the firſt joynt of the little toe.

4.

The

The number of the Muſcles of each part.

THe eye-lid hath	4
The occipitals on each ſide	1
Each eye hath	6
The noſe hath	6
Theſe are in number	17
Both the lips have	10
The lower jaw hath	10
The eare hath	10
The tongue hath	8
The bone of the tongue hath	8
The *larynx* hath	10
The *uvula hath*	2
The *pharynx* hath	7
Theſe are in number	65
The head hath	14
The neck hath	8
The breaſt hath	30

The loyns have	6
The *abdomen* hath	10
The prick hath	4
The *clitoris* hath	4
The ſtones have	1
The bladder hath	1
The *anus* hath	3
Theſe are in number	81
The ſhoulder-blade hath	5
The ſhulder hath	8
The *ulna* hath	6
The *radius* hath	4
The wriſt hath	4
The palme of the hand hath	2
The four fingers have	19
The thumbe hath	5
Theſe are in number	53
The thigh hath	11
The ſhank hath	13
The inſtep hath	7
The toes have	23
Theſe are in number	54
The totall ſumme of all the muſcles of the body of man	270

AN

AN ENUMERATION OF ALL THE MUSCLES OF THE WHOLE BODIE.

EAch *eye* hath one frontall to lift it up: the first is called *orbicularis major*, under the frontall; and two called *ciliares*, one in each eyelid to shut it.

The muscles of the eye-lids foure in each.

The occipitals which meet these, are two, one on each side.

As for the *eare*, in the outside there are foure paire: first, *par attollens*, lifting it up: secondly, *par deprimens*, pulling it down: thirdly, *par adducens*, which moveth it forward: fourthly, *par abducens*, which pulleth it backwards. In the inside there are two, *externus*, the exter-

The muscles of the ears. 10.

externall; and *internus*, the internall.

The muſcles of the eye, 6.

The *eye* hath ſix muſcles, foure ſtraight, and two oblique.

The firſt of the ſtraight is called *attollens*, or *ſuperbus*.

The ſecond is *deprimens*, or *humilis*.

The third *Adducens*, or *hibitorius*.

The fourth *Abducens*, or *indignatorius*.

The oblique are two:

1. *Obliquus major, ſeu ſuperior.*

2. *Obliquus minor, ſeu inferior.*

The muſcles of the noſe, 6.

The *noſe* hath ſix muſcles.

Erectores, or pullers upwards two.

Dilatatores, or openers, two.

Conſtrictores, or pullers together two, one in each ſide.

The muſcles of the lips, 10.

The *lips* have two common muſcles, and four proper.

Of the common, the firſt is called *zygomaticus*, the ſecond *buccо*.

Each *lip* hath four proper:

1. *Attollens*, which beareth up the upper lip.

2. *Depri-*

2. *Deprimens*, which beareth the lower lip downwards.

3. *Orbicularis*, or *ſphincter*, which maketh up the fungous ſubſtance of the lips.

4. *Abducens*, or drawing aſide.

The muſcles of the lower jaw 10.

The *lower jaw* is moved upwards by three muſcles: the *temporalis*, the *pterigoideus internus*, and the *maſſeter*.

It is pulled down by *diagaſtricus*, and *muſculus latus*.

It is pulled forward by *pterigoideus externus*.

The muſcles of the tongue, 8

The *tongue* hath eight muſcles, four on each ſide.

1. *Genioglоſſus*, which draweth it forwards.

2. *Miloglоſſus*, it helpeth the thruſting of it out.

3. *Baſiglоſſus*, or *hypſiglоſſeus*, by the which it is pulled backwards.

4. *Styloglоſſus*, or *ceratoglоſſus*, by the which it is moved to the ſides.

The *os hyoides* hath four muſcles on each ſide.

1. *Ster-*

The muſcles of the bone of the tongue.

1. *Sternohyoides.*
2. *Genihyoideus:*
3. *Coracoidæus.*
3. *Styloceratoideus.*

4. The muſcles of the larynx.

The *larynx* hath four common muſcles, and five proper.

Of the common there are,

1. Two *hyothyroidæi*, which pull up the *larynx.*

2. Two *Bronchii* which pull it down.

Of the proper,

1. *Cricothyroidæus anticus:*
2. *Cricothyroides lateralis.*
3. *Cricoarytenoides poſticus.*
4. *Thyroarytenoides ſive glottæus.*
5. *Arytenoides.*

The muſ. cles of the pharynx. 7.

The *pharynx*, or beginning of the *æſophagus* hath ſeven muſcles, three paires, and one without a match.

Of the paires.

1. *Shenopharingæus.*
2. *Cephalopharingæus.*
3. *Staphylopharingæus.*

That which hath no match is called *æſohpagæus.*

The

The *gargareon* hath two Muſcles.

1. *Pteryſtaphilinus externus*, this holdeth it up.

2. *Pteryſtaphilinus internus*, this doth the ſame.

The muſcles of the *uvula*. 2.

The *head* hath two ſorts of muſcles: for ſome are common, and ſome are proper: the common which together with the neck move the head; and theſe are the muſcles of the neck.

The muſcles of the head. 4.

The proper are thoſe which onely move the head, when the neck remaineth immoveable: and theſe are in number fourteene. It is pulled forward by the two *maſtoidei*: theſe are placed before; theſe bend it forward. Behinde twelve are placed.

Proper muſcles. 14.

1. *Splenius, vel triangularis.*

2. *Complexus, vel trigeminus.*

3. *Recti majores*, two.

4. *Recti minores*, two; theſe ſtretch out the head.

5. *Obliqui majores, ſive ſuperiores*, two.

6. *Obliqui minores, ſive inferiores*,

feriores, two: these wind the head about.

The neck hath foure on each side.

The muscles of the neck, 8.

It is bended by two pairs.

1. *Par longum.*

2. *Par spinatum, triangulare, scalenum.*

It is extended by two paires.

1. *Semispinatum.*

2. *Transversarium.*

Seeing 64. muscles serve for one side of the head and neck, there must be 128. for both the sides.

The trunke of the body hath 46 muscles for one side.

The muscles of the breast..

As for the brest, first, these dilate it.

1. *Subclavius.*

2. *Serratus major.*

3. *Serratus posticus superior.*

4. *Serratus posticus inferior.*

5. *Intercostales externi*, fifteene in number, which are as one muscle.

The brest is contracted by fifteene in number

1. Sacro-

1. *Sacrolumbus.*
2. *Semiſpinatus*, or *triangularis.*

The internall intercoſtals, in number thirteene.

Diaphragma.

Double this number, and you ſhall have 32.

The loynes are bended by the *triangulares*, one on each ſide. The muſcles of the loines.

They are extended by foure, two on each ſide.

1. *Semiſpinatus.*
2. *Sacer*: two of them on each ſide. The muſcles of the belly, 10

The *abdomen* hath five on each ſide.

1. *Obliquus aſcendens.*
2. *Obliquus deſcendens.*
3. *Rectus.*
4. *Tranſverſalis.*
5. *Pyramidalis.*

The muſcles of the ſtones, 2.

The ſtones have two cremaſters to elevate them.

The muſcles of the prick, 4.

The prick hath two, on each ſide.

1. *Erector*, or *Collateralis.*

2. *Ac-*

2. *Accelerator*, or *interior*.

The muscle of the bladder 1. The muscles of the *anus*, 3.

The *bladder* hath one, the *sphincter*.

The *anus* hath three muscles: one to purse it in, *called sphincter*; and two to pull it up, called *levatores*.

Double this number, and you shall have 92.

The Arme hath 44. muscles.

The muscles of the Arme. The muscles of the shoulder-blade, five on each side.

The shoulder-blade hath five muscles on each side.

1. *Trapesius*, for sundry motions.

2. The proper *levator*, or lifter up.

3. *Rhomboides* which draweth it backwards:

4. *Serratus minor anticus*, drawing it backwards.

5. *Serratus Major*.

The muscles of the shoulder. 8.

The *brachium* or shoulder hath eight.

1. *Deltoides*. 2. *Supraspinatus*. } moving it upward.

3. *Latissimus*. 4. *Rotundus major*. } drawing it downward.

5. *Pectoralis.* } pulling it for-
6. *coracoides.* } ward.

7. *Rotundus minor* } pulling it
8. *Immersius*, or *infraspinatus.* } backward.

The *elbow* hath ten muscles. The muscles of the *ulna*, 6.
The *ulna* hath six.

1. *Biceps.* } bend it.
2. *Brachiæus internus.* }

3. *Longus.* } extend
4. *Brevis.* } it.
5. *Brachiæus externus.* }
6. *Angonæus.* }

The *radius* hath four. The muscles of the *radius*, 4.
1. *Pronator rotundus superior.*
2. *Pronator inferior quadratus.*
3. *Supinator longus.*
4. *Supinator brevis.*

The *carpus*, or wrist hath four muscles. The muscles of the wrist, 4.
1. *Cubitæus internus.*
2. *Brachiæus internus.*

3. *Ra-*

3. *Radius externus, sive bicornis.*
4. *Cubitæus externus.*

} these extend it.

The muſcles of the fingers, 8 in each hand.

The fingers have eighteen muſcles.

1. *Sublimis.*
2. *Profundus*

} by theſe they are bended.

3 *Communis extenſor magnus.*
4 Proper to the fore-finger or *indicator:*
5. Proper to the little finger, or *auricularis.*

} theſe extend the fingers.

6. *Interoſſei.*
7. *Lumbricales*, 4.

} theſe partly part them, partly draw them together.

8. *Abductor digiti parvi.*
9. *Abductor indicis, ſive indicator.*

The muſcles of the thumb, 6.

The thumb hath ſix muſcles.

1. *Lon-*

1. *Longus.* 2. *Brevis.* } these extend it.

3. One it hath to bend it.
4. *Thenar* bendeth it forward.
5. *Antithenar* bendeth it backward.

Double the number of 42. the number of the muſcles of one arm, and you ſhall finde 84. muſcles of them both.

The thigh hath ten muſcles.

The muſcles of the thigh, 10.

1. *Pſoas.* 2. *Iliacus,* 3. *Pectinæus.* } these bend it forward.

4. *Glutius maximus.* 5. *Glutius medius.* 6. *Glutius minimus.* } these bend it backwards.

7. *Quadriceps*, or *quadrigemini*, 4 ſmall muſcles. } these bend the thigh outward

8. *Triceps*, this bendeth it inwards.

9. *Obturator internus*, this rowleth it outwards.

10. *Obturator externus*, this rowleth it inwards.

Double the number 10. and you ſhall have 20. muſcles for both thighs.

The leg hath 42. muſcles.

The muſcles of the leg. Of the *tibia* 11

The *tibia* hath 11.

1. *Seminervoſus.*
2. *Semimembranoſus*
3. *Gracilis internus, ſeu poſticus.*
4. *Biceps.*

} theſe bend it.

5. *Membranoſus, ſeu faſcia lata.*
6. *Sutorius, ſive longus.*
7. *Vaſtus externus.*
8. *Vaſtus internus.*
9. *Rectus gracilis.*
10. *Crureus.*

} theſe extend it.

The muſcles of the feet 9.

11. *Suppopliteus*, or *pepliteus*, this moveth it obliquely.

The inſtep hath eight muſcles.

1. *Tibiæus.*

1. *Tibiæus anterior.* } these bend
2. *Peronæus anterior.* } it.

3. *Gemelli due* or the twins. }
4. *Plantaris.* } these extend it.
5. *Solæus.* }

6. *Tibæus posticus.* }
7. *Peroneus posticus.* } these move it obliquely.
8. *Plantaris.* }

The toes have eighteen muscles. — The muscles of the toes, 23.

1. *Longus.* }
2. *Brevis.* } these bend them.

3. *Sublimis.* }
4. *Profundus.* } these extend them.

5. *Interossei* eight these bring them together and sever them.

6. *Lumbricales* foure.
7. *Caro musculosa*, or the musculous flesh
8. *Transversalis.*
9. The drawer in of the little toe.

} these draw them together. — The muscles of the great toe, 4.

The great toe hath four muscles.

1. *Extenſor*, or extender.

2. *Flexor*, the bender.

3. *Adducens*, that which draweth to the reſt.

4. *Abductor minimi digiti*, that which draws the little finger from the reſt.

Double the number of 42 expreſſing the number of the muſcles ſerving for one Leg, and you ſhall havelthe number of 84. which is the number of the muſcles of both the Legs.

THE

The Explication of some Appellations of the Muſcles and ſome other parts of the BODY.

ANcyroides, *anchorlike.*

Ancon, *the bending of the elbow.*

Acromium, *the upper part of the ſhoulder blade.*

Arytenoidæus, *becauſe it beginneth and endeth in the ewarlike cartilage.*

Bronchus, *the lower part of the windepipe.*

Biceps, *becauſe it hath two heads.*

Ceratogloſſus, *becauſe it ariſeth from the points of the bone of the tongue, and is inſerted into the tongue.*

Coracohyoidæus, *becauſe it ſpringeth from the proceſſe of the ſhoulder blade like the crowes bill,*

and is inserted into the bone of the tongue.

Cephalopharingæus, *because it beginneth where the head is joyned to the neck by the first* vertebra, *and is inserted into the* pharinx.

Crycothyridæus, *because it springeth from the ring-like cartilage, and is is inserted into the* thyroides.

Crycoarytenoidæus, *because it beginneth at the ringlike, and endeth at the ewar-like cartilage.*

Corone *is the processe of the lower jaw.*

Coracoides, *like the crows bill.*

Cremaster, *it holds up the stone.*

Deltoides, *because it is like to the Greek letter* Δ.

Geneogloſſus, *because it hath its beginning from the chin, and is inserted into the bone of the tongue.*

Gluteus, *because it maketh up the buttockes.*

Gaſtrocnemius, *because it maketh up the calfe of the leg.*

Hypſilogloſſus, *because it hath its beginning from the bone of the*

tongue

tongue and is inſerted into the tongue.

Hyothyroidæus, *becauſe it ſpringeth from the bone of the tongue, and is inſerted into the buckler-like cartilage.*

Larynx *is the beginning of the winde-pipe, derived from* λαρυγγίζειν, *which is to ſhout with an open mouth. It is framed of foure cartilages: the firſt is* Thyroides, *buckler-like: the ſecond and third is* Arytenoides; *ewar-like: thi fourth is* Cricoides, *ring-like.*

Mylogloſſus, *becauſe it hath its beginning at the root of the grinders of the lower jaw, and is inſerted into the tongue.*

Maſtoidæus, *becauſe it is inſerted into the dug-like proceſſe of the tempil.*

Maſſeter, *becauſe it ſerves for eating.*

Pharinx *is the throat.* Pſoa, *becauſe it is clipped in embracing.*

Rhomboides, *becauſe it is like the mathematicall figure called* rhombus, *having foure lines, but not the foure ſides equall.*

Sternohyoidæus, *becauſe it hath its beginning from the* Sternum, *and is inſerted into the bone of the tongue.*

Styloceratohyoidæus, *becauſe it ſpringeth from the bodkin-like progreſſe, and is inſerted into the points of the bone of the tongue.*

Sphænopharingæus, *becauſe it ſpringeth from the wedge-bone, and is inſerted into the* pharynx.

Stylopharingæus, *becauſe it beginneth at the bodkin-like proceſſe, and is inſerted into the* pharynx.

Styloides, *becauſe it repreſenteth the pin of a Table-booke, or a needle.*

Sternohoidæus, *becauſe it beginneth at the* Sternum, *and is inſerted into the bone of the tongue.*

Spinatus, *which is placed by the ſharp brim of a bone.*

Sigmoides, *which is like to the Greeke* Σ.

Sphænoides, *the wedge-like bone.*

Sphincter, *the drawer together.*

Thyroa-

Thyroaritenoidæus, *because it beginneth at the buckerlike cartilage, and endeth in the ewar-like.*

Trigeminus, *which hath three beginnings.*

Trapezius, *because it hath foure sides bounded with unequall lines: for the Geometers so call such a figure.*

The explication of the fourth Figure.

1. *The bones of the head.* 2. *The bones of the chaine of the back.* 3. *The ſhoulder-blade.* 4. *The ribs.* 5. *The* os ſacrum. 6. *The thigh-bone.* 7. *The bones of the knee.* 8. *The bones of the legs.* 9. *The bones of the feet.*

Fig. IV.

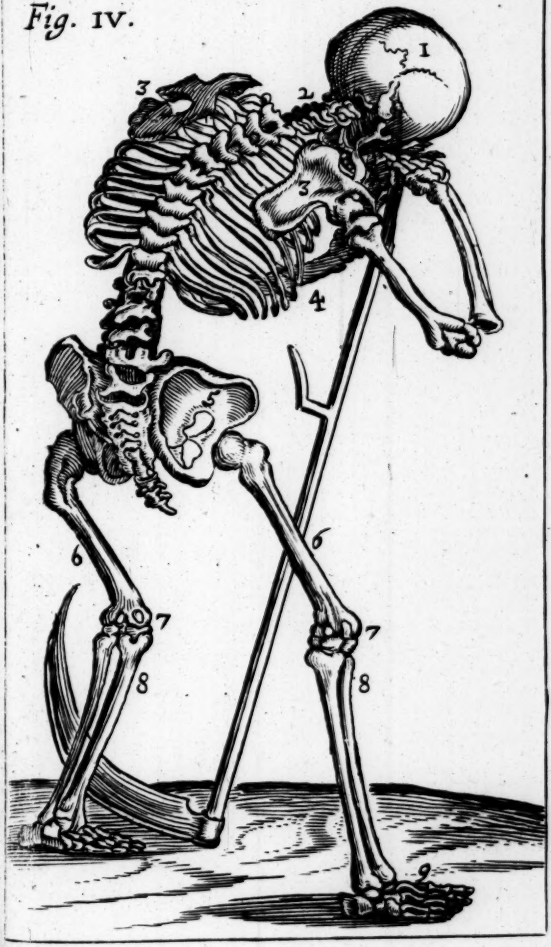
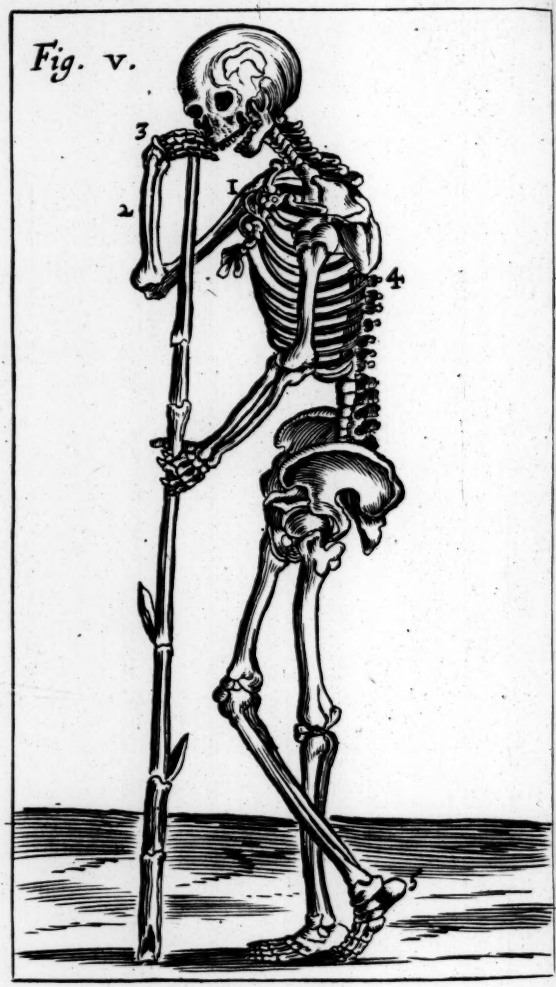


Fig. V.



TABLE

The explication of the fifth Figure.

1. *The ſhoulder-bone.* 2. *The elbow-bones.* 3. *The bones of the hand* 4. *The bones of the backe.* 5. *The heele-bone.*

Theſe two figures are to be placed in their order immediately before the firſt Chapter of the book of bones.

THE

The fourth BOOKE Of the Bones.

Cap. I.

Of the nature of a Bone.

TO the perfecting of a bone foure cauſes concur. Firſt, the efficient cauſe; which is the oſſifick faculty of the ſpirit, unto which the naturall heat miniſtreth. Secondly, the materiall cauſe; which is twofold: The one is of the generation, the other of the nutrition of the bone. The matter of generation is the thickeſt

thickeſt part of the ſeed: The matter of nutrition is blood, with the which all parts of the body are nouriſhed; and not the marrow. For firſt, ſmall bones have no marrow. Secondly, the marrow is hot and moiſt, but the bones cold and dry. The veins and arteries which carry this nutrimentall blood, are placed in the ends of the bones, as in the ſcull, thigh-bone, and the great ſocill of the legge. The marrow ſerveth for the moiſtening of the bones, which are dry and ſtill in motion. No nerves paſſe to the bones; for they onely feel by the benefit of the *perioſtinum*. Thirdly, the formall cauſe is twofold, by the eſſentiall it is cold and dry; the accidentall is the figure, which for the moſt part is either round or flat. Fourthly, the finall cauſe is double: the generall, which ſerveth the whole body; and it is threefold: Firſt, they eſtabliſh the ſoft parts: Secondly, they give figure to the parts: Thirdly, they further the motion of the body.

Lib. de aſſib. ad Tyron.

The

The ſpeciall is that which is proper to every particular bone. Of the premiſes ſuch a deſcription of a bone may be gathered: *A bone is a ſimilary part, moſt dry and cold, inflexible, compacted of the thickeſt part of the ſeed by the ſpirit, the naturall heat concurring, to afford ſtableneſſe and figure to the whole body.*

Cap. II.

Of the naturall affections of Bones.

THeſe affections are either com-to all bones, or proper to ſome only.

The common are nine. For firſt, a bone muſt be hard, the better to ſtay the body: Secondly, without it muſt be ſlippery, for ready motion: Thirdly, it muſt be white, becauſe it is a ſpermatick part and nouriſhed by blood. Fourthly, it muſt be deſtitute of feeling, for avoiding of pain in motion.

motion. Fifthly, it must be either hollow or spongious, to contain a marrowy substance, for moistning of them. Sixthly, it must be tipped in the ends with a cartilage, and be bedewed with an unctuous humour, to procure an easie motion. Seventhly that it be covered with a membrane, to preserve it from cariosity, except the three bones of the eare, the parts of the teeth above the gummes. Eighthly, that about the ends it have holes, to admit veines and arteries for nourishment. Ninthly that it be equall. Wherefore the *callus* wherewith a broken bone is united and nodes in the pox, are not naturall affections. By these you may pronounce a bone to be ill affected: First, if it be soft; because it must cause the member to be too flexible. Secondly, if it be dry; for then it is distempered. Thirdly, if it be white, for then it is dead. Fourthly, if be black; for then it is carious. Fifthly, if its figure be altered;

tered; for then it muſt hinder the action of the part.

The proper affections are four: The firſt is a cavity; and it is twofold: for it is either deep, and it is called *cotyle*; or ſhallow, and it is called *glene*. The ſecond is a bunching out; and it is either harder than the reſt of the bone, and it is called *apophiſis*; or it is ſofter, and it is called *epiphiſis*. If the bunching out be round, it is called *caput*; under it is the *cervix*, as in the upper end of the thigh-bone, If it be flat, it is called *condilus*: if pointed, *corone*. Other protuberancies are named from the ſimilitude they have from other things; as *ſtyloides*, bodkin-like; *coracoides*, crow-like, &c. The third is inequality: this is ſeene in the nowl for the inſertion of the muſcles. The fourth is ſmoothneſſe, as the reſt of the skull.

CAP.

CAP III.

Of the differences of the joyning of bones together.

THey are coupled together either by joynting or growing together. Jointing is either for manifeſt or obſcure motion. The jointings which ſerve for manifeſt motion are three. Firſt, *Enarthroſis*, and it is when a large head of a bone is received in a deep cavity, as the thigh-bone in the hip-bone. Scondly, *Arthrodia*; it is when the cavity which receiveth is ſhallow, and the head of the bone which is received ſhallow: ſuch is the articulation of the lower jaw with the tempil-bone. The third is *Ginglymos*; when the ſame bone receiveth, and is received. This falleth out three manner of wayes; firſt, when the bone is received by another, and receiveth the ſame; this is ſeen in the articulation of the ſhoulder-bone with the elbow.

bow-bone. Secondly, when a bone receiveth one bone, and is received by another: this may be ſeen in the ſpondils of the back, where the middle bone receiveth the upper, and is received by the lower. The third is, when the proceſſe of the bone being long and round, is inſerted into another upper bone, and ſo is turned in the cavity as if it were in an axle-tree; ſo is the ſecond *vertebra* of the neck with the firſt.

Articulation for obſcure motion may be obſerved in the articulation of the ribs with the ſpondils, and in the bones of the wriſt and ankle.

Bones grow together either without ſome middle ſubſtance, or with it: Without ſome middle ſubſtance they are coupled three manner of wayes. Firſt, by a line, as the bones of the upper jaw and noſe are coupled: this is called *harmonia*. Secondly, by a ſuture, as the bones of the ſcull are united. Thirdly, when one bone is faſtened

ned in another, as a nail in wood; and and are the teeth faſtned in the gums: this is called *gomphoſis*. If bones grow together by a middle ſubſtance, it is either by a cartilage; and ſo are the ſhare-bones joyned: this unition is called *ſynchondroſis*: or by a ligament, and ſo the thigh is joyned with the hip-bone: this is called *ſyneuroſis*. Or laſt of all by fleſh, and ſo is the bone of the tongue to the ſhoulder: this is termed *ſyſſarcoſis*.

The uſes of the coupling of bones are theſe. Firſt, for motion. Secondly, for perſpiration, as in the ſutures of head. Thirdly, to give way to the paſſing of ſome ſubſtance as the ſame ſutures to give way to the *dura mater* to make the *pericranium*. Fourthly, for ſecurities ſake, as one may ſee in a member where many bones are. Fifthly, to put a difference between parts, as we perceive in the bones of the upper jaw.

CAP.

Cap. IV.

Of the futures of the head.

THe bones of the whole body belong to theſe foure parts of it; the head, neck, the breſt, the lower belly: and the limbs. The head is that part which is above the *vertebræ* of the neck: of it there are two parts, the skul, and the jawbones. The skull is that bony ſubſtance which containeth the brain, and is decked with haire. In the deſcription of the bones of the head theſe two things are to be noted; the ſutures, and the number of the bones. The ſutures are either proper, or common: the proper are thoſe which joyne the bones of the skull one with another; and they are either true ſutures, or counterfeit. The true are thoſe which repreſent two combes joyned together by their teeth, theſe are three in number: the firſt is *coronalis*: it is ſeated in the fore part, and

and passeth from one tempil to the other transversly. The second is *lambdoides*, opposite to this resembling the Greek letter Λ. The third is *Sagittalis*: this uniteth both, and beginning at the top of the *lambdoides*, reacheth sometimes to the nose.

The counterfeit, or *mendosæ* resemble a line onely. The remarkable of these are the *squamosæ*, or skale-like sutures: these unite the bones of the tempils with those of the *vertex*, or top. They are two, one above each eare: they begin from the backside, in the lower part of the *processus mammillares*, and passe through the whole side of the skull. The common sutures are those which belong to the skull, the wedge-like bone, and the upper jaw. The most remarkable are these: first, *frontalis*, by the which the outer processe of the *os frontis* is joyned with the first bone of the upper jaw. The second is *cuneiformis*, by the which the wedge-like bone, it being in the middle of it, is joyned with the first bone of the upper

upper jaw. The third is *cribrosa*: this is common to the wedge-like bone, and the *septum*, or partition of the nose. The sutures have three uses: the first is to stay the braine from tottering by staying of it, by sending some fibres from the *dura mater* through the sutures. The second, to breath out of the vapour sent unto the braine from the lower parts. The third to stay fractures from going further.

Cap. V.

Of the proper bones of the head.

THese are in number six, one of the fore-head, another of the noddle, two of the crown, and two of the temples. First, *os frontis*, the forehead-bone: It is bounded be the coronall and first common suture, before and in the sides by the temporall bones. It is but one of those of ripe rge, but double in children, being divided

b

by a ſuture paſſing from the coronall to the noſe. On each ſide of this bone in the upper part of the eye-browes, there is a large cavity and often two, from whence two holes paſſe to the hollowneſſe of the noſe.

Theſe cavities containe a clammy ſubſtance, kept in by a greene membrane. This receiveth the aire containing in it ſome odour received by the noſe to ſtay it awhile before it be ſent to the braine. It hath two holes in the middle part of the eie-row, which goe to the orbit of the eye; by the which, the firſt branch of the nerve of the third conjugation of the braine to the muſcle of the fore head. It hath alſo foure proceſſes; the greater two are ſeated about the greater corner of the eie, but the leſſer two about the leſſer corner.

The bones of the crown are in number two: Before they are joyned with the bone of the forehead, by the coronall ſuture, with the noddle bone by the ſuture

lambdoides

lambdoides, to the tempil-bones, by the *ſuturæ ſquamoſæ*, without they are ſmooth, but within unequal, by reaſon of the prints which the jugular veins of the *dura mater* leave.

Under theſe are the bones of the tempils. They are joyned with the bones of the crowne by the *ſuturæ ſquamoſæ* in the ſides; before with the firſt bone of the upper jaw by its firſt proceſſe, to the nowle-bone, by the counterfeit ſuture. Theſe bones are thin in the upper part like a skale; but below thick, hard and unequall, or rough, wherefore they are called *Petroſa*, rocky. In theſe are *meatus auditorii*, by the which the ſounds paſſe to the braine. Of the furniture of this paſſage, peruſe *lib.* 3. *cap.* 23. of the inward parts of the eare. Theſe bones have ſundry holes for the letting of veſſels to the braine.

The nowle-bone is called *os occipitale* and is joyned to the crowne-bones, by the ſuture *lambdoides*.

It

It is the thickeſt of all the bones of the head. It is ſmooth without; but hath ſundry ſinuoſities to receive the meninges ſafely: through the great hole of this bone the *ſpinalis medulla* paſſeth to the backbone.

Theſe bones of the skull have two tables: The uppermoſt is hardeſt, thickeſt and ſmootheſt. The lower is unequall, and pitted to give way to the veſſels diſperſed through the *dura mater*. Betweene theſe two tables there is a certaine ſpongious ſubſtance marrowie, and red, for the nutrition, and humectation of the bones. It is red, by reaſon of the ſmall veins paſſing that way: this ſubſtance hath a threefold uſe: firſt, it receiveth blood for the nutrition of the skull. Secondly, in fractures of the skull, it cauſeth the *porus ſarcodes* the ſoonner to grow. Thirdly, it furthereth the diſcharging of vapours from the braine.

CAP. VI.

Of the bones common to the skull and upper jaw.

Hitherto of the bones proper to the skull: Now follow those which are common to it and the upper jaw: these are three: First, the wedge-like bone, or *cuneiforme*; so called, not that it is like a wedge, but that it is seated in the middle of the bones of the skull and the upper jaw. Before it is joyned with the forehead bone, by a bastard, as also to the nowle-bone. At the sides it doth accompany a good way the *os petrosum*, from whence it is separate by a rough chink. Above, it doth touch the first, fourth, and sixth bone of the upper jaw; below, it toucheth the bones of the palate of the mouth by the wing-like processes. It is thick and solid where it maketh the basis of the skull; it is the thickest of all the bones of the head,

head, where there is a cavity, like to thoſe above the eye-browes, of the proceſſes of it, within the skull, *Sella Turcica*, the Turkiſh Saddle is framed, in the middle of it the *glandula pituitaria*, which receiveth the pituitous excrements falling from the braine. Without the skull you ſhall finde one on each ſide, about the ſides of the holes of the noſe like unto the wings of a Bat, and from thence called *proceſſus aliformes*. It hath ſundry perforations, by the which the motorie and opticke nerves of the eye, and other nerves for the motion of other parts, as veſſels alſo, veines and arteries from nouriſhment paſſe. The ſecond common bone is *os cribriforme*, becauſe, like a ſive, it hath many holes: by theſe, ſmells paſſe to the braine. A proceſſe like to the combe of a Cocke, and therefore called *criſta galli*, divideth the upper part. Another thin bone paſſeth above to the inſtruments of ſmelling, and below to the noſtrils, dividing the noſe in two

parts, the right and the left called *ſeptum naſi*. This bone giveth way to the diſcharging of the excrements of the brain.

The third common bone is *os jugale*, or the yoke-bone. It is placed on every ſide of the face between the cavity of the hearing and the firſt bone of the upper jaw. It is framed of two bones: the hinder is a proceſſe of the temple-bone about the paſſage for hearing: the fore-bone is a proceſſe of the firſt bone of the upper jaw, which maketh the leſſer corner of the eye. Theſe two bones are joyned by an oblique ſuture, and make the yoak bone, becauſe like a yoak it ſtayeth the ſides of the upper jaw. It ſtrengthneth the tendon of the temporall muſcle which paſſeth to the lower jaw, and the muſcle *maſſeter*.

CAP. VII.

Of the jawes.

NOw follow the bones of the face; they are the jaw-bones, the teeth and bone of the tongue. The jaws are two, the upper and lower: The ſubſtance of the upper jaw is not ſolid, but ſpongious as the pumix ſtone; and unequall, becauſe it is framed of ſundry bones; they are fixe paire, fixe in each ſide. The firſt is *zygomaticum*: it maketh up the beſt part of the yoak bone, the outer corner of the eye, and a great part of the orbit of the eye. *Zygoma*, or the yoak-bone, is nothing elſe but a bonie half circle made of two proceſſes: whereof the one proceedeth from the *os petroſum*; but the other is a portion of the cheek-bone. The ſecond is *os lachrymale*, it is a round little and thin bone in the inner corner of the eye, whereon the *caruncula lathrymalis*

reſteth in the lower part of it there is a hole which paſſeth to the cavity of the noſe: by this the third branch of the third paire of ſinews of the braine paſſeth to the inner membrane of the noſe. The third is thin as the former, but quadrangular. It is joyned with the bone of the forehead, and the wedge-like bone. The fourth is *os malæ*, the cheek-bone, the greateſt and thickeſt. This containeth all the upper teeth, and maketh up the holes of the noſe, and moſt of thoſe bones which belong to the upper part of the face. It is joyned above with the bone of the forehead, but below with the wedge-lik bone; before with the *os lachrymale*, behinde with the third, and laſt of all with its fellow. The fifth is long, hard, reaſonable, thicke; it maketh up the bony part of the noſe. It is joyned with the cartilages of the noſe below; but to the internall proceſſe of the *os frontis* above. The ſixth doth make up the rooſe of the mouth with its fellow.

fellow. Six bones then make up the orbit of the eye. The first is *Frontale*, which maketh the upper vaulted part. The second is placed in the outside, where the lesser corner is, and is a portion of the wedge-like bone. The third maketh up the outside concurring with the former portion of the wedge-like bone. The fourth and fifth make up the inside. The sixth maketh up the lower part. These within the orbit are discerned partly by common, partly by proper sutures.

The lower jaw in those of ripe age is but one bone; but in beasts it is compacted of two bones. It resembleth the Greek letter *v*, or a bow: that portion which pointeth out in the arched part is called the chin. At both the ends of it there are two processes, whereof the one is sharp, and is called *coronæ*: and receiveth the tendon of the temporall muscle. The other may be called *articularis*, because it serveth for articulation. Within this jaw there is a long cavity which ariseth

at the roots of theſe proceſſes. By it is the third branch of the third paire of ſinewes of the braine, together with a veine and artery to the teeth. This may be found out by a ſmall copper wire. This only is moveable, and both have ſockets for the teeth; they are in number equall with the number of the teeth; they are enlarged by the teeth; and when in old age the teeth fall out, the ſockets draw together, and become ſharp.

CAP. VIII.

Of the teeth.

THe teeth are placed in the gummes. Their articulation is not uniform; for they are infixed into the gummes as a nail to a poſt by *gomphoſis*. Their root is tyed to the mandible by a nerve, for ſteadine ſſe, by *ſinneuroſis*.; and the upper part compaſſed by the fleſhy ſubſtance of the gumme, by *ſyſſarcoſis*. One

One thing is to be noted, That the Cutters and Dogges-teeth ſometimes are implanted into the gummes by a crooked phang: whereby it it falleth out, that when ſuch teeth are drawn, the ſocket muſt be fractured.

Their ſubſtance is hardeſt of all other bones; yet they do grow: for if a tooth in either gumme be drawn, the tooth oppoſite to it will in time fill up the vacuity leſt after the drawing of the other. Their figure repreſenteth a naile; for in the top they are flat, and in the root ſharp. Towards the root they have a cavity compaſſed every way by a membrane, by the which they have an exquiſite ſenſe of feeling the firſt qualities, heat and cold much affect them, by reaſon of the membrane; yet ſecond qualities, as hardneſſe and ſoftneſſe, do not offend them.

The teeth have veines from the jugulars, arteries from the ſoporalls, and nerves from the third conjugation. Seeing theſe veſſels

proceed from the principall parts, the liver, heart, and braine: it is no wonder that children when they breed teeth are troubled with fevers, lasks and convulsions; the principall parts be effected by consent.

As for the number of them, commonly there are found sixteen in each gumme; if there fall out any difference in individuall persons, it falleth out by reason of the *molares*.

These are three ranks of teeth. Those of the first rank are called *incisores*, Cutters. Most commonly foure are found in each jaw: they have but one phang, and so easily fall out. These first make way out of the gummes, because the tops of them are sharpest. Those in the second rank are called *canini*, or dogges-teeth, from their length, hardnesse and sharpnesse above the rest. In each jaw there are two, at each side of the cutters one; they are called eye-teeth, not that they reach to the orbit of the eye; for they mount no higher then the

no-

noſtrils ; but becauſe ſprigs of the nerves which move the eyes, are carried to them. Thoſe in the third ranke are called *molares*, grinders ; Becauſe as mills they grinde the meat. Moſt commonly they are twenty in number, five in each ſide of every jaw : Of theſe the foure next to the Dogge. teeth are perfected in the youth; but the other two come not out until the twenty eight, or thirty years, yea, ſometimes the old age it ſelf come on. In ſome they never appeare. They are called the teeth of wiſdome. Theſe have more roots then the other. Thoſe of the upper jaw have more fangs than thoſe of the lower jaw ; firſt, becauſe they hang : ſecondly, becauſe the ſubſtance of the upper jaw is not ſo firme as that of the lower. The two of the upper *jaw* next to the *canini*, have two fangs, the reſt three. Thoſe next to the Dogs-teeth in the lower *jaw* have but one fang, and the reſt but two.

The uſe of the teeth is to chew the

the meat to prepare it for the ſtomacke to make a laudable *chylus*; wherefore the cutters pull the meat aſunder; the Dog-teeth breake it, and the grinders make it ſmall, wherefore they are flat in the top, that they may receive and keepe the meat, and rough, that they may bruiſe it the better.

The teeth come out in man the ſeventh month, and ſometimes more ſlowly, but in beaſts ſooner, becauſe they are to eat ſolid meat. Of theſe teeth, ten in each gumme, to wit, the foure cutters, the two Dogges teeth, and foure grinders doe caſt. The fore teeth caſt the fourth, fifth, and ſixth yeares of the age, the hinder ſlower.

CAP. IX.

Of the Bone of the Tongue.

THis bone is ſeated under the lower *jaw*, in the uppermoſt part of the *Larynx*. It is like to the

the Greek vowel υ, or the lower jaw; becauſe it is arched before, and ſpread like hornes behind. There are three parts of this bone. The firſt part upholdeth the tongue, which reſteth upon the upper part of it, and is called *baſis linguæ*. The other two are laterall, and are called *cornua*, or hornes. Theſe bones are tyed to the adjacent parts, partly by a fleſhy, partly by a nervous ſubſtance. This bone ſerveth to keep the throat open, that that the meat may deſcend into the ſtomack, and the ayre have paſſage to the wind-pipe while we ſpeake and breathe.

CAP. X.

Of the bones of the neck.

Hitherto then of the bones of the head, now follow the bones of the neck.

They are of two ſorts, to wit, the *clavicula* or cannell bones, and the

the *vertebræ*. They are called *claviculæ*, becauſe they repreſent the figure of keys uſed in ancient times. They are like the great Roman S, for they ſeeme to be framed of two ſemicircular bones: but placed one oppoſite to another. The ſubſtance of theſe bones is hollow, but more about the heads, and leſſe about the middle. In number they are two, one on each ſide. Neere the throat they are round; but towards the ſhoulder flattiſh. They are tyed to two bones, to wit, to the ſhoulder-blade, and the breſt bone. The uſe of them is to uphold the ſhoulder-blades, that they ſhould not fall upon the breſt together with the ſhoulder-bone; which falleth out when there is a fracture in them.

The *vertebræ* of the neck are in number ſeven. The bones of theſe are harder than of the other, becauſe they are more moved. Theſe have firſt a large hollowneſſe to give way to the *ſpinalis medulla*: then

then two holes in the tranſverſe proceſſes, one in each ſide, through which veines and arteries paſſe to the head. Theſe *vertebræ* being uppermoſt are leſſer then the reſt. They have proceſſes oblique, tranſverſe, and thoſe behinde. Theſe laſt are forked, if you except the firſt and laſt two. The firſt *vertebra* hath no ſharpe corner, leſt the two ſmall muſcles of the head ſpringing from the ſecond *vertebra* ſhould be hurt when the head is ſtretched out; upon this the head is moved forwards and backwards. The ſubſtance of this is harder, ſolider and thinner than that of the reſt, becauſe it is the leaſt, and the cavity of it is biggeſt. The *ſinus* of it where it receiveth the tooth-like proceſſe, is garniſhed with a cartilage round, where the proceſſe is. Here the head is turned round. As for the ſecond out of the middle of it the tooth-like proceſſe doth ſpring long and round. It is joyned with the firſt *vertebra* by a broad

broad ligament compaſſing it. If a luxation happen here, it is deadly. The four that lie under theſe, in all things are like the reſt: their laterall proceſſes are large, and parted at the ſharpe corners, to receive the more muſcles. The ſeventh is she largeſt of all. It is like to the *vertebræ* of the breaſt; for it hath neither tranſverſe proceſſes, neither is the hindermoſt forked.

CAP. XI.

Of the vertebræ of the breſt.

THE bones of the breſt are the *vertebræ*, the ribs and breſt-bone: As for the *vertebræ*, they are twelve in number, unto which ſo many ribs anſwer; whereof ſeldome doth one abound, more ſeldome lack. Their bodies are round in the fore-part; but behinde ſomewhat hollow. As for proceſſes, they have foure oblique, ſerving

ſerving for ſtrong articulation, two laterall, and one ſharpe behinde, not divided. They have two hollowneſſes, on each ſide one, lined with a cartilage to receive the tops of the ribs. As for holes, they have one large in the middle, which containeth the marrowy ſubſtance, and two leſſer, beſides, on each ſide one.

One thing is to be noted, that the twelfth *vertebra* is not joyned as the reſt by *gyglymos*, but by *arthrodia*. Wherefore extending, bending, and turning are performed by this *vertebra*.

CAP. XII.

Of the Ribs.

THe ribs are twelve in number. Their ſubſtance is partly bony, partly cartilaginous; the firſt ſerving for firmneſſe; the ſecond for articulation. The bony ſubſtance towards the *vertebræ* is thick

thick and rondiſh, but towards the *ſternum* flat and thin. The cartilages in bigneſſe anſwer the bigneſſe of the ribbes: for the bigger ribs have the bigger cartilages, and by the contrary. The ribs in the upper part are blunt, but in the under ſharper. In the lower part they are grooped to receive the intercoſtall veſſels, the veins, arteries, and nerves.

Theſe ribs are of two ſorts; for they are either long or ſhort: the long reach to the breſt-bone, and cauſe a circle: they are ſeven in number. Theſe are articulate with the breaſt bone by *arthrodiæ*; for in the breſt-bone there are ſundry cavities, which receive the cartilaginous tops of them. To the *vertebræ* they are joyned, their ends cartilaginous being received in the hollowneſſe of the *vertebræ*, and are ſtrengthened by ligaments.

The ſhort are ſemicircular; without arched; within hollow. The uppermoſt and lowermoſt are ſhorteſt, but the middle longeſt.

Theſe

These in the forepart bend upwards, and are joyned to themselves, and the cartilages of the long ribs, if you except the twelfth. In the hinder part they are articulate and strengthened as the long; but the eleventh and twelfth stick in the *vertebræ* by one top onely. The use of the ribs is; first to be a defence to the heart and lungs; secondly, to further the motion of the breast; for they strengthen the fleshy parts.

CAP. XIII.

Of the Breast-bone.

THis is not one entire bone, but is framed of three; whereof the uppermost and lowermost are alike in all ages, and but one. The second in infants is composed of three bones, which become one, the seventh yeare of the age being expired. In children all these bones are gristly, but afterward become bony:

bony : in aged perſons it ſeemeth one bone, yet it is diſtinguiſhed by three tranſverſe lines, ſhewing the firſt diviſion, which are more conſpicuous in the inſide than outſide. Theſe bones are of a red fungous ſubſtance full of ſmall holes : the upper part is more hard then the lower.

The upper bone is thickeſt and broadeſt ; it hath in each ſide a long cavity, lined with a cartilage to receive the points of the cannel bones ; betweene theſe is a pit called *jugulum*. The ſecond bone is neither ſo thick nor broad, yet foure times as long, it receiveth in its cavities the cartilages of the third, fourth, fifth and ſixth ribs. The third is leaſt of all, yet it is broader than the ſecond, unto the lower parts of which it is joyned. To the end of this is annexed the cartilage called *mucronata* or *enſiformis*, or ſword like, but the hole breaſt-bone compacted of three bones doth reſemble the handle of a ſword which in ancient times was uſed,

uſed being halfe moone like in each ſide. Under this is the pit of the ſtomack, where the upper and left orifice of it is called *ſcrobiculus cordis*. The ancients call this orifice *cor*, or heart, becauſe the paines of it are like the paines of the heart, and called *cardialgiæ*.

CAP. XIV.

Of the vertebræ *of the Loines.*

THe bones belonging to the lower belly are theſe; five *vertebræ*, *os ſacrum*, *os coccygis* and *os iſchii*. The *vertebræ* of the loins are in number five; they are larger than thoſe of the breaſt, becauſe they uphold them, and the lowermoſt of them are biggeſt. They are long and ſemicircular: their ſubſtance is ſpongious like a pumix ſtone, and full of holes, to give way to the veines. They have one large hole, to give way to the *ſpinalis medulla* and two ſmall, by the

the which nerves paſſe to the adjacent parts, and veines and arteries come in. As for the proceſſes, the upper and lower differ from thoſe of the breſt: for in thoſe the upper parts were knobby, but the lower hollow; but in theſe the contrary is ſeene; for the upper parts are hollow and the lower knobby. The tranſverſe are long and ſmall. The hindermoſt are ſhort and ſtrong. In the backpart of theſe there is a rough hollowneſſe to receive *os ilium*.

CAP. XV.

Of the os ſacrum; *and rump-bone.*

IT is ſo called from the bigneſſe. The Latines imitating the Greekes called things large *ſacra*. This is the broadeſt of all the bones of the backe, and doth uphold the whole frame of the *vertebræ*. In infants is is compoſed of five bones, moſt commonly united by

by a cartilage; but in men of ripe age it ſeemeth but one bone. Theſe bones are *vertebræ*, for each of them hath a body and proceſſes, and hath a large hole to receive the *ſpinalis medulla*. In this theſe differ from the other *vertebræ*, becauſe in thoſe the lower part is bigger, but in theſe leſſer; wherefore the uppermoſt is the biggeſt, and the loweſt the leaſt. Theſe have a large hole to receive the *ſpinalis medulla*, and other leſſer framed of the unition of the *ſinus* to ſend out nerves. As for the proceſſes, the oblique can hardly be diſcerned but in the firſt: The tranſverſe are long, ſo united that all ſeeme but one. The upper part is thickeſt; the hindermoſt are like the *ſpinæ* of the loines, but leſſe, and the lower leſſer; in ſo much that the lowermoſt hath no proceſſe, but a round bunching out.

To the *os ſacrum* the rump-bone is joyned by a cartilage: for the firſt bone of it hath a ſmall hol-

lowneſſe

lowneſſe which receiveth the laſt *vertebra* of *os ſacrum*. It is called *os coccygis*, the Cuckoes bill, from the likeneſſe of it. It is framed for the moſt part of three bones, whereof the lower is ſtill leſſer. In men it is bent inward to ſtay the ſtraight gut, and the ſphincter muſcle which are tyed to it; but in women outward, to give way to the matrix in the time of birth. The bones of this are ſpongious and ſoft, and have neither proceſſe nor any hollowneſſe. Their unition with the *os ſacrum* is looſe, to give way to great excrements when they come out; for otherwiſe a luxation might be procured, as in hard labour ſometimes it falleth out.

CAP. XVI.

Of the Hoop-bone

THis bone is called *os innominatum*, or without any proper name

name by ſome; but by the moſt learned *os iſchii.* I have termed it the hoope-bone, partly becauſe it ſtrengthneth the *os ſacrum*, upon which all the *vertebræ* of the back do reſt; Partly becauſe the motion of the inferior bones are ruled by the muſcles which ſpring from this bone. In children it appeareth framed of three bones, joyned by a cartilage untill the ſeventh yeer, but in men of ripe age theſe three, the cartilage being dryed, ſeeme but one entire bones The firſt is called *os ilium*, the huckle-bone, becauſe under it lieth the ſmall gut called *ilium.* This is the broadeſt, and greateſt in figure, ſemicircular, arched without, within hollow. The ſemicircle is called *ſpina*, the arched part *dorſum*, the hollow part *coſta*. It is joyned with the *os ſacrum*, and this to it, by mutuall proceſſes of the cavities. The ſecond is called *os coxendicis*, or the hip-bone. This being placed betweene the huckle and ſhare-bones, receiveth in its cavity the thigh-

bone. This cavity is large, and hath brimmes, and is covered with a cartilage. The third bone is *os pubis*, and *pectinis*, or the ſhare-bone; it is ſeated in the fore-part, in the middle it is parted by a cartilage not very hard. Theſe three bones, together with the *os ſacrum*, make that cavity which is called *Pelvis*, which is bigger in a woman than in a man; in it are contained the guts bladder and part of the *matrix*, wherefore it is a ſhield for them. In hard labour the ſhare-bones and the *os ſacrum*, will part; the carttlages and ligaments, being bedewed with ſuperfluous humidity, giving way.

CAP. XVII.

Of the ſhoulder-blade.

NOW follow the bones of the limmes, which are legs and armes. The bones of the armes are either above the joynt of the ſhoulder, or under. Above the joynt

joynt lyeth the ſhoulder-blade. The ſubſtance of it is for the moſt part hard and ſolid; the outſide is ſomewhat arched, but the inſide hollow, it ſeemeth triangular. It is joyned to ſundry parts by *ſyſſarcoſis*, or concarnation, by meanes of the muſcles. It is joyned with the nowle bone by the cucullar muſcles; to the *vertebræ* of the neck by the ſecond paire of them; to the back by the muſcle *rhomboides*. The broad end is called *acromium*; the other end under this, narrow and thick, is called *cervix*. Here is the anchor-like proceſſe, which hindereth diſlocation that way: wherefore ſeldome is the *adjutorium* put out forward. In the inſide of this bone about the middle there is a hole, by the which a vein doth paſſe for nouriſhment of it. The ſhoulder-blade hath a threefold uſe. Firſt, it receiveth the *adjutorium*, and maketh the articulation called *arthrodia*. The cavity of the ſhoulder-blade which receiveth the

adjutorium is ſhallow, that the arme might readily move every way. This hollowneſſe is recompenſed three manner of wayes; firſt, by a ſtrong ligament, which compaſſeth the joynt: Secondly, by the tendons of three muſcles, *ſupraſpinatus*, *infraſpinatus*, and *ſubſcapularis*, doing the ſame. Thirdly, by a cartilage which cleaveth orbicularly to the ligament, but not to the hollowneſſe. Secondly, ſundry muſcles ſpring from the ſhoulderblade. Thirdly, it defendeth the back from being hurt.

CAP. XVIII.

Of the Shoulder-bone.

NOw the bones of the Arme, under the joynt are three; the ſhoulderbone, the elbow-bones, and the bones of the hand. The ſhoulderbone is of a hard and ſolid ſubſtance: it is hollow all alongſt like a whiſtle, wherein a marrowy

marrowy ſubſtance is contained. At the two ends it is broad, but round in the middle. In the top of it there is a long chinke through which the nervous head of the *muſculus biceps* doth paſſe. In the lower end you ſhall obſerve the pully, about the which the *ulna* is turned, which is in the inner knob; to the outer knob which is covered with a cartilage, the *radius* is joyned. At the ſides of theſe are two ſmall knobs from whence muſcles ſpring. About the middle of this bone in the inſide, you may perceive a hole through the which a veſſell doth paſſe to the marrowy ſubſtance for nouriſhment.

CAP. XIX.

Of the Elbowbones.

THeſe are in number two; to wit, the leſſer above called *radius*, and the larger below called *ulna*. Their ſubſtance is firme

and ſolid, if you except the additaments of them. Both of them are long, and containe a marrowy ſubſtance: uthey are ſomewhat rough, by reaſon of the lines appointed for the muſcles.

The *ulna* is large above, leſſer below: it ſerveth for the ſtretching out and bending of the arme, and ſo it is articulate by *gynglymus*; but the *radius* is leſſer above, but longer below, to receive the bones of the wriſt: it is joyned by *arthrodia* and ſerveth for the turning up and down of the hand. The *radius* above is received by the *ulna*, but below the *ulna* is received by the *radius*. They are joyned together by a long ligament, which ſerveth the internall muſcles from the externall. The ſe micircular knob in the hinder part of the *ulna* is called by *Hippocrates ancon* by *Galen olecranon*. Theſe two b'ones part about the middle; partly that the *radius* might the more eaſily performe its ſemicircular motion, partly to receive the muſcles.

CAP.

CAP. XX.

Of the bones of the Hand.

THE hand is divided into three parts: the wriſt, called *carpus*; the diſtance betweene the wriſt and fingers called *metacarpus*; and the row of fingers.

The bones of the wriſt are eight in number, whereof there are two orders: the upper hath three bones ſo joyned together, that they ſeeme one; the fourth is the leaſt of all, and placed under the little finger. The inferior hath foure bones; they are joyned together by *harmonia*, becauſe their motion is obſcure. The upper rank is joyned with the lower part of the *ulna* by *arthrodia diarthrodes*; bat the lower with the *metacarpus*, by *arthrodia ſynarthrodes*.

One thing is to be noted, that the annular ligament doth compaſſe the wriſt, and comprehendeth the tendons, which paſſe

through the cavity of the *carpus*.

Metacarpus hath foure bones; they are of a ſolid ſubſtance, hollow and round, bigger than thoſe of the fingers: that which anſwereth the pointing finger is biggeſt, and ſo ſtill the lowermoſt are leſſer. Betweene each two a diſtance is left for the *muſculi interoſſei* of the fingers. Above and beneath they have an appendix; by the upper they are joyned to the wriſt, by the lower to the fingers; the upper hath a cavity, but the lower a round long top, covered with a cartilage.

In the palme of the hand there is a tranſverſe ligament, the which doth tye the bones of the fingers to the *metacarpium*. The thumb hath no connexion with the bones of the *metacarpium*. Firſt, becauſe it is articulate with the wriſt by *diarthroſis arthrodialis* and hath a manifeſt motion; but the bones of the *metacarpus* are joyned to the wriſt by *ſynarthroſis* and have no manifeſt motion.

Secondly,

Secondly, becauſe the upper of the thumb is ſhorter than the bones of the *metacarpium*, and not anſwerable to them.

As for the fingers, each of them hath three bones, each of them anſwering a bone of the *metacarpus*, the thumb excepted; their upper additaments have ſinuoſities, but the lower knobs. Theſe bones are joyned by *gynglymus*, and ſo they onely ſtretch themſelves out, and pull themſelves in. As for their obliquation, it doth depend upon the *enarthroſis* of the firſt bone with the *metacarpus*. Beſides theſe bones in the inſide of the hand, ſome ſmall bones called from their figure *ſeſamoidea*, like the ſeeds of *ſeſamum*, or oylie pulſe, or Turky millet: they reſemble the knee-pan, and ſeeme to ſerve for the ſame uſe; for in ſtrong extenſions they ſtrengthen the tendons. In the ſecond joynt of the thumbe there are two. The ſecond and third joynt of the forefinger have each one, the reſt have two in the firſt

joynt. In children they are of a cartilaginous substance.

CAP. XXI.

Of the Thigh-bone.

THE leg is divided into three parts, the thigh, the shank, and foot. The thigh hath but one bone: but of all others it is the biggest: the two ends of this are to be noted. In the upper part there is a round head; the slender part under it is called the neck: it is long and oblique; for if it were straight, it would cause halting by pressing down the groyne. A strong ligament doth keep in the head within the hollowness of the *Ischium*. If this ligament be relayed or torn, it causeth halting. From the neck spring two prominences: and because the muscles called *rotatores* are fastned to them, they are called *trochanteres*. The hindermost is the lesser trochanter

chanter; but the laterall or uppermoſt the bigger. The lower end of the thigh-bone hath two flat and low prominences, leaving a cavity in the middle which receiveth the *aphyſis* of the *tibia*. And againe theſe prominences are received by the cavities of the *tibia*, by a looſe *gynglymus*. The lower part of this articulation is called the knee, the hindermoſt the ham. Above the knee appeareth a bone, not joyned with any other bone, called the pan, or *patella*: it is ſomewhat round, about two inches broad, plain without having many holes, but within bunched, covered with a cartilage. It is ſet before the thigh bone and the *tibia* to ſtrengthen the articulation; for otherwiſe the thigh-bone would ſlip out forward in going down any hill. It cleaveth to the knee by the thick tendons of the ſecond, third, and fourth muſcles, which extend the *tibia*, and paſſe by the knee to it, and are implanted into the fore-knob of it. Two

ligaments

ligaments faſten the articulation of the thigh-bone with the *tibia*: the one is circular compaſſing both, the other is long, placed betweene the two bones, reddiſh, by reaſon of the veines there. Behinde there are two ſeed-bones, tyed to the two beginnings of the firſt muſcles which moveth the foot to ſtrengthen them. Great wounds of the ham are mortall, by reaſon of the great veſſels which paſſe that way.

CAP. XXII.

Of the bones of the ſhank.

THE ſhank is compoſed of two bones. The great focill is called *tibia*, the leſſer *fibula*. In the upper part it hath a proceſſe, which is received by the hollowneſſe of the thighbone. It hath alſo two long cavities, for the receiving of the two prominences of the thigh-bone. To help the ſhallowneſſ

lowneſſe of theſe cavities, there is joyned by ligaments a moveable cartilage ſoft, ſlippery, and bedewed with an unctuous humour, which being thick, becommeth thinner towards the center: it is called *cartilago lunata*, the Moon-like cartilage. It is joyned to the thigh-bone by *gynglymus*. The *fibula* onely cleaveth to the *tibia*, and toucheth not the thigh-bone. The *tibia* cauſeth the internall ancle. About the middle it hath a conſpicuous hole to let in a veine for nouriſhment. This bone is triangular, having three lines; the ſharpeſt before is called *ſpina*; of the poſterior the inward is blunt; but the outward ſomewhat ſharpe The *fibula* is a firme bone alſo, and as three ſquare likewiſe, one line is before, and two behinde; the upper end hath a hollowneſſe covered with the cartilage in the inner ſide, which receiveth the laterall knob which is under the appendix in the upper end of the *tibia*, the lower end maketh the outer ancle.

CAP.

CAP. XXIII.

Of the bones of the Tarsus.

OF the foot as of the hands there are three parts, *tarsus*, *metatarsus*, and the toes. The *tarsus* is the distance betweene the lower end of the two focils, and the beginning of the five bones which are articulate with the toes: It hath seven bones; the first is *talus*, or the game-bone, the great and small focill are joyned with it and so the foot is stretched out, and drawne in, as also moved to the other side; all beasts with a cloven foot have this bone. in the upper part it is articulate with the *tibia* by *gynglimus*, and so below with the heele-bone. The second is called *cisos*, the heele bone under the *talus*, this receiveth the great tendon called *nervus Hectorius*, composed of the tendons of the muscles of the shank. Above it receiveth the *talus*, below it is received by *os cubiforme*.

cubiforme. The third is called *naviculare*, from its figure; for it is long, without bunched, but within hollow, being covered with a cartilage, where it receiveth the end *ostalus*. The fourth is called *cuboides*: becauſe it hath ſix ſides, repreſenting a *cubus*. In the fore-part it is joyned to the fourth and fifth bone of the *metatarſus*; in the hinder with the heelebone; but in the inſide, it, with the reſt of the ſides are joyned with no bones, but are free. The three enſuing are called *cuneiformia*, or wedgelike bones; for above they are broad; but below they are narrow; being joyned, they repreſent a vault: for above they are arched, but under hollow, to receive the tendons and muſcles, and not to touch the ground, for that the *cuboides* onely doth. The firſt of thoſe bones is the greateſt, wedgelike ſeated in the inſide of the foot. The ſecond is the leaſt, placed in the middle. The third is that which is meane betweene both in bigneſſe. Theſe three

three are joyned with the bootlike bone, or *os naviculare*.

CAP. XXIV.

Of the reſt of the bones of the Foot.

THe *Metatarſus*, or inſtep, hath five bones: for one is appointed for the ſtaying of the great toe, which is not in the hand.

They are ſolid wthout, hollow within, longer than the bones of the back of the hand. That which ſtayeth the thumb is thickeſt, the longeſt is that which ſtayeth the next toe: and although all the reſt of the toes are of an equall thickneſſe, yet the uppermoſt are longer than the lowermoſt: the lowermoſt parts are inſerted into the hollowneſſe of the firſt joynts of the toes; but the uppermoſt ends are received by the bones of the *tarſus*. That which ſtayeth the thumb is received by *cuneiforme majus*: the ſecond by *cuneiforme minus*: the third by the third wedge-like bone: the other two by the two tops of *os cubiforme*.

The

The bones of the toes are in number fourteene; for the great toe hath onely two, but the reſt three. Theſe bones are ſolid without, and hollow within; they have three joynts, and two proceſſes: the lowermoſt hath two knobs, received by the top of the lower, but the uppermoſt receiveth: the uppermoſt joynts have a deeper hollowneſſe, becauſe they receive the ends of the bones of the inſtep. The ſeed-like bones are ſeated as they are in the hand, two are in the ſecond joynt of the thumbe, which ſtrengthen the tendon of the muſcles which bend it.

CAP. XXV.

Containing an explication of ſome termes which are found in Anatomical Authors in the Doctrine of Bones.

COtylæ are termed deepe cavities in the articulation of the bones.

Glenæ,

Glene or *glenoides* are ſhallow cavities.

Epithyſis, or *appendix* is called a bone which groweth to the end of another bone. It is of a ſpongious ſubance, at the firſt griſtly, but afterward becommeth bony; it may be ſeen in both the ſocils of the legs at both the ends.

Apophyſis, or *tuberculum* is a part of a bone not added, but bunching out above the ſmooth ſuperficies, if it be ſharp, it is called *ſpina*.

Condylus, is a low prominence, and flat.

Corone is a ſharp prominence.

Supercilia, or *labra*, are the upper brimmes of the cavities of the joynts.

CAP. XXVI.

Of the number of the Bones.

IN Ancient times they were holden to be 246. according to this diſtich.

Adde

Adde quater denis bis centum ſenaque habetis,
Quam te multiplici condidit oſſe Deus?

But the diligence of late Anatomiſts hath found out more.

Thus then they may be ſummed:

The head hath	8
The lower jaw	1
The upper jaw	11
The teeth are 32. ſometimes	28
The *ſpina* hath	24
The *oſ ſacrum*	5
The ribs are	24
The breſt-bone 1. but compoſed of	3
The Cannel-bones	2
The ſhoulder blades	2
Of the *Iſchium*	3
In the armes	60
In the feeet	64
The bones of the ears	6

The great ſeed-like bones of the great toes.

If with ſome Anatomiſts you reckon 24. ſeed-like ſmall bones in the two hands, and ſo many in the two feet, and two in each ham, and

and the eight bones in each hand, between the *carpus* and *metacarpium*, and the bony ſubſtance annexed to the *cuboides* in both the feet; in old perſons you ſhall have 54. more, which being joyned to 246, make up 302 expreſſed thus:

Ter centum & binis compactum eſt oſſibus iſtud,
Quod gerimus corpus: non eſt quod plura requiras.

If thou 302 bones chance to finde,
Few or none are left behinde.

CAP. XXVII.

Of a Cartilage.

A Cartilage is a ſimilary part, dry and hard, yet not ſo as a bone; flexible, which a bone is not; framed to ſtay the ſoft parts, and to repell the iniuries of externall hard bodies. 1. Then it ſtayeth the ſoft parts. 2. It defendeth them. 3. They cover the ends of the bones which have a looſe articulation. 4. They knit bones together: as is ſeene in the ſharebone.

The

The differences are taken firſt, from the figure; ſo as the cartilage of the breſt bone is called *enſiformis*, and thoſe of the *Larynx ſigmoides* like C. Secondly, ſome are ſolitary, not joyned with other bodies, as thoſe of the ears and eye-lids: ſome are joyned, as moſt of the reſt. Thirdly, ſome ſtill continue cartilages, ſome degenerate into bones, as in women, the cartilages of the ribs, which lye under the breſts: for theſe growing very big, they become bony, the better to hold them up. They are in ſundry parts of the body. 1. In the head there are foure, to wit, of the eyelids, noſe, and ears; and the *trochlea* of the eye. 2. In the breſt there be three, to wit, the cartilages of the *larynx*: the ſmall pipes of the winde-pipe, diſperſed through the lungs, and *cartilago enſiformis*. 3. The long ribs are joyned to the *ſternum* by cartilages. 4. The *vertebræ* of the back are joyned together by cartilages. Laſt of all ſundry are ſeen in the articulations, which

which are looſe, and in the conjunction of bones.

CAP. XXVIII.

Of a Ligament.

A Ligament is a ſimilary part without feeling, in ſubſtance meane, betweene a cartilage and a membrane, appointed firmely to knit the joynts.

Of the ligaments ſome are membranous (ſuch are thoſe which inviron the joynts;) ſome cartilaginous, as thoſe which are betweene the joynts, as is ſeene in the articulation of the thigh-bone with the *coxendix*.

Ligaments are to be found in divers parts of the body. Firſt, the bone of the tongue hath two ſtrong ligaments, one on each ſide. Beſides, on each ſide it hath round ones, by the which it is tyed to the adjacent parts to ſtay it in the middle of the mouth. Secondly, the tongue hath a ſtrong membranous ligament in the lower part about the middle of it. About the end of it

it the *frænum* is to be ſeen, which if it come to the fore-teeth, it hindereth the motion of the tongue and ſpeech. Children being ſo troubled, as ſaid to be tongue-tyed, and muſt have it cut. Thirdly the ligaments which tye the *vertebræ* of the breſt and loynes, the ribs with the *vertebræ*, and the ribs with the breſt-bone, are membranous. Fourthly, ſundry are to be ſeene in the belly. The firſt tyeth the *os ilium* to *os ſacrum*: the ſecond tyeth the *os ſacrum* to the *coxendix*. The third joyneth the ſhare-bones, and is cartilaginous. The fourth compaſſeth them circularly, and is membranous. The fifth compaſſeth the hole of *os pubis*, and is membranous. Fifthly, in the arme theſe appear. 1. Five tye the *adjutorium* to the ſhoulder-blade. 2. The bones of the elbow, *ulna* and *radius*, are tyed firſt one to another; ſecondly, to the ſhoulder-bone; and thirdly, to the wriſt by membranous ligaments. 3. There are two annular ligaments, which being tranſverſe, direct

direct the tendons which passe to the fingers, they are two; one in the outside of the tendons of the extending muscles; the other in the inner side for the tendons of the contracting muscles. 4. The bones of the wrist, back of the hand, and fingers, have membranous ligaments. 5. In the leg these may be found out.

First, the thigh bone is tyed to the *Coxendix*, by two ligaments.

Secondly, the lower end of it is tyed to *Tibia* and *Fibula* by six ligaments.

Thirdly, the *Tibia* is joyned to the *Fibula* by a membranous ligament.

Fourthly, *tibia* and *fibula* are joyned to the ancles by three ligaments.

Fifthly, the ancle is tyed with the bones of the foot by five ligaments.

Sixthly, the bones of the instep and toes are tyed with such ligaments as those are which are seene in the hand.

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